UNIVERSITÉ DU QUÉBEC À MONTRÉAL

PREDICITIVE VALIDITY OF BEHAVIOURAL INHIBITION AND ATTACHMENT: INFLUENCE ON INTERNALIZING AND EXTERNALIZING BEHAVIOURAL PROBLEMS IN CHILDHOOD AND INTOLERANCE OF UNCERTAINTY IN ADULTHOOD.

THESIS
SUBMITTED
IN PARTIAL FUFLFILLMENT OF THE REQUIREMENTS OF
A DOCTORAL DEGREE IN PSYCHOLOGY

BY
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DECEMBRE 2013

UNIVERSITÉ DU QUÉBEC À MONTRÉAL

L'INHIBITION COMPORTEMENTALE ET L'ATTACHEMENT: INFLUENCE SUR LES PROBLÈMES INTÉRIORISÉS ET EXTÉRIORISÉS À L'ENFANCE ET L'INTOLÉRANCE À L'INCERTITUDE À L'ÂGE ADULTE.

THÈSE
PRÉSENTÉE
COMME EXIGENCE PARTIELLE
DU DOCTORAT EN PSYCHOLOGIE

PAR
MAGDALENA ZDEBIK

DÉCEMBRE 2013

ACKNOWLEDGEMENTS

I would first like to thank my supervisors, Ellen Moss and Jean-François Bureau, whose remarkable expertise, valuable insights and highly-appreciated suggestions made this work possible. I would like to thank Ellen for letting me pursue my interests, for all the opportunities she made available to me in the lab and through new collaborations, for always being available, even when she was half way across the world, and for helping me on my way to becoming a researcher and clinician, my long term ambition. Her remarkable knowledge of attachment has thought me so much, both as a researcher and a clinician. I am also extremely grateful to Jean-François for all the helpful discussions and for sharing his expansive expertise. I also want to thank him for answering my many questions and for all his incisive suggestions, even when he was at his busiest. Their enthusiasm for my results and belief in me as a researcher were greatly encouraging throughout this process. I am incredibly grateful to have worked with such knowledgeable and outstanding researchers and thank them for their guidance and support throughout this process. I hope that this is only the beginning of our collaboration.

I would also want to thank my colleagues and laboratory for enriching my doctoral experience through many stimulating discussions and collaborations. I would particularly want to thank Katherine, Geneviève and Vanessa for their friendship and kindness and for always being helpful. Furthermore, I will not forget the valuable statistical expertise and guidance received from Jean Bégin, our departmental statistician. He helped me expand and solidify my statistical knowledge enormously. I would like to thank the MAVAN team, particularly Michael Meaney, Leslie Atkinson, Hélène Gaudreau and Josie Diorio, for all their help throughout the years. I would also like to thank the University of Maryland Child Development Laboratory, particularly Nathan Fox and Kate Degnan, for their valuable collaboration.

I want to thank my parents, Elżbieta and Zbigniew, for their love, understanding and support throughout my studies, and for repeatedly letting me know how proud they are of me. I would like to thank my brother, Jakub and his wife Barbara for their love and empathy, having themselves gone through years of academia and several degrees. I want to thank my

nephew Eliot for being incredibly cute and supportive with his cheerful clapping. And to all my friends, for their incredible friendship throughout all these years.

I finally would like to thank my partner Simon Reader, whose immeasurable love and support, day in and day out, helped me through this experience. Aside of the thousands of valuable comments and lengthy late night discussions on my manuscript, taking over every single household chore during my writing, his wonderful cooking, and most importantly his love, encouragement and patience, helped me achieve this goal. This would not have been possible without you.

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RÉSUMÉ

Cette thèse évalue l'influence indépendante et interactive de l'inhibition comportementale et de l'attachement sur le développement de troubles psychologiques. Dans la première étude, nous avons premièrement créé et validé une nouvelle mesure d'inhibition comportementale (BIM) basée sur des enregistrements vidéo de la Situation Étrangère, puis nous avons évalué si l'attachement et l'inhibition comportementale (IC) à la petite enfance étaient reliés indépendamment et de façon interactive aux comportements intériorisés et extériorisés. Soixante-dix-sept bandes vidéo comportant la Situation Étrangère d'enfants âgés de 18 mois et de leur mère ont été utilisées pour mesurer les réactions des enfants devant une situation nouvelle et inhabituelle afin de créer le BIM. La Situation Étrangère a également été utilisée pour mesurer l'attachement. Afin de valider le BIM, des mesures de tempérament ont été utilisées. Le Questionnaire des Comportements du Nourrisson-Révisé (IBQ-R; Rothbart & Garstein, 2003 et le Questionnaire des Comportements à la Petite Enfance (ECBQ; Putnam, Gartstein & Rothbart, 2006) ont été complétés par la mère lorsque l'enfant était âgé de 6 et 18 mois, respectivement. Lorsque les enfants étaient aussi âgés de 18 mois, un questionnaire mesurant les comportements timides et sociaux observés à domicile (N-COTA) complété par des assistantes de recherche, a également été utilisé pour valider le BIM. Les mères ont complété la Mesure Socioémotionnelle du Tout petit (ITSEA; Briggs-Gowan & Carter, 1998) afin de mesurer les comportements intériorisés et extériorisés de leur enfant à l'âge de 18 mois. Finalement, des bandes vidéo provenant d'un laboratoire reconnu (CDL) étudiant l'inhibition comportementale ont été utilisées pour valider le BIM davantage.

Le BIM n'était pas associé à la classification de l'attachement et avait des indices de fidélité excellents. De plus, le BIM était corrélé aux questionnaires de tempérament, soit aux échelles mesurant la peur et l'approche positive de l'IBQ-R et la timidité et la sociabilité de l'ECBQ ainsi qu'au N-COTA, démontrant une bonne validité convergente. Nous avons pu aussi démontrer une validité divergente de notre mesure en lien avec les autres dimensions des questionnaires sur le tempérament. De plus, le BIM était associé à la mesure d'inhibition comportementale du laboratoire CDL. Enfin, le BIM était lié aux comportements intériorisés et non aux comportements extériorisés des enfants. Cependant, l'attachement était lié aux comportements extériorisés et non aux comportements intériorisés. Aucun effet d'interaction n'a été observé entre l'inhibition comportementale et l'attachement en lien avec les troubles de comportements. Ainsi, l'attachement et notre nouvelle mesure d'inhibition comportementale (BIM), même si codées à partir d'un même paradigme, peuvent prédire de façon différentielle les comportements intériorisés et extériorisés des jeunes enfants.

Dans la seconde étude, une approche longitudinale a été utilisée pour examiner l'étiologie de l'intolérance à l'incertitude. L'intolérance à l'incertitude est un facteur de risque de psychopathologie future, tel que le trouble d'anxiété généralisée. Après avoir adapté le BIM aux enfants d'âge préscolaire, nous avons examiné la contribution indépendante et interactive de l'attachement préscolaire et de l'inhibition comportementale sur le développement de l'intolérance à l'incertitude chez les jeunes adultes, en contrôlant pour le névrotisme et l'anxiété maternelle. Soixante enfants de 6 ans ont participé, avec leur mère, à une tâche de séparation-réunion mesurant l'attachement. Des bandes vidéo d'une séance de jeu libre, précédant la tâche de séparation-réunion, ont été utilisées pour mesurer l'inhibition

comportementale avec le BIM. Les mères ont complété l'échelle d'anxiété de l'Inventaire des Symptômes 90-révisé (Derogatis, 1994) lorsque les participants avaient 14 ans. À 21 ans, les participants ont eux-mêmes complété l'Inventaire de Personnalité NEO-Révisé (Costa, & McCrae, 1992) en tant que mesure de névrotisme ainsi que l'échelle d'Intolérance à l'Incertitude (version courte) (IUS-12; Carleton, Norton & Asmundson, 2007).

L'attachement (spécifiquement de type ambivalent et désorganisé contrôlant) ainsi que l'inhibition comportementale ont été tous deux indépendamment et positivement liés à l'intolérance à l'incertitude. Cette association a été maintenue même en contrôlant pour l'anxiété maternelle et le névrotisme. Aucun effet d'interaction n'a été observé entre l'inhibition comportementale et l'attachement. L'anxiété maternelle était positivement associée à l'inhibition comportementale et à l'attachement insécurisé de l'enfant, mais n'était pas liée à l'intolérance à l'incertitude. Cette étude est la première à démontrer, empiriquement et de façon longitudinale, un lien entre l'intolérance à l'incertitude et les patrons d'attachement ambivalent et désorganisé contrôlant, ainsi que l'inhibition comportementale. Ces résultats contribuent à accroître nos connaissances par rapport à l'étiologie de l'intolérance à l'incertitude. De plus, ces résultats permettront de développer non seulement de nouvelles thérapies préventives pour des troubles tels que l'anxiété généralisée, mais également pour tout autre trouble psychologique relié à l'intolérance à l'incertitude.

En somme, les résultats de cette thèse démontrent que le BIM est un outil efficace pour évaluer le tempérament de l'enfant. Étant une mesure observationnelle et grâce à sa facilité à pouvoir être intégré aux études existantes ayant des données vidéo, le BIM a notamment un avantage sur les questionnaires rétrospectifs. De plus, l'attachement et l'inhibition comportementale à l'âge préscolaire contribuent tous deux de façon indépendante au développement de future psychopathologie, et ce sur une période de 15 ans. Ces résultats soulignent l'importance de l'influence des caractéristiques individuelles et dyadiques de la petite enfance sur la psychopathologie future et la nécessité de développer de nouvelles thérapies préventives tant individuelles que familiales.

Mots clés: inhibition comportementale; attachement; troubles intériorisés; troubles extériorisés; intolérance à l'incertitude.

SUMMARY

This thesis examines the independent and interactive influence of behavioural inhibition and attachment on the development of psychopathology. In the first study, after creating a new behavioural inhibition measure (BIM) based on footage of the Strange Situation and validating it against temperament questionnaires, we examined if infant attachment and behavioural inhibition (BI) predicted concurrent internalizing and externalizing behavioural problems independently and interactively. Video footage of the Strange Situation of 77 18-month-old children and their mothers was used to measure children's reactions to an unfamiliar situation and create the BIM. The Strange Situation procedure was also used to measure attachment. The Infant Behaviour Questionnaire (IBQ-R; Rothbart & Garstein, 2003) and Early Childhood Behaviour Questionnaire (ECBQ; Putnam, Gartstein & Rothbart, 2006) were used as temperament validation measures for the BIM and were completed by the mothers when children were 6 and 18 months old respectively. A non-caregiver observational questionnaire (N-COTA) completed by research assistants measuring shyness and sociability in the home-setting was used to further validate the BIM. Maternal reports of internalizing and externalizing behavioural problems were measured with the Infant-Toddler Social and Emotional Assessment (ITSEA; Briggs-Gowan & Carter, 1998) when children were 18 months old. A separate sample of video footage from a well-established Child Development Laboratory (CDL) studying behavioural inhibition was also used to validate the BIM.

The BIM had strong inter-rater reliability and was not related to attachment classification. The BIM correlated with maternal reports on the Fear and Approach scales of the IBQ-R, the Shyness and Sociability scales of the ECBQ as well as the N-COTA and demonstrated divergent validity with temperament dimensions unrelated to behavioural inhibition. Moreover, the BIM was correlated with the pre-existing CDL behavioural inhibition classification. Finally, the BIM correlated with internalizing but not externalizing behavioural problems, whereas attachment classification was related to externalizing but not internalizing problems. No interaction effects were found between behavioural inhibition and attachment. Thus attachment and our new behavioural inhibition measure (BIM), although coded from the same paradigm, provided differential predictive information for childhood internalizing and externalizing problems.

In the second study, we used a longitudinal approach to investigate the etiology of a cognitive precursor to later psychopathology, such as generalized anxiety disorder: intolerance of uncertainty (IU). After adapting the BIM to preschool aged children, we examined the independent and interactive contribution of preschool attachment and behavioural inhibition to the development of intolerance of uncertainty in young adulthood, while controlling for neuroticism and maternal anxiety. Sixty 6-year-olds and their mothers participated in a separation-reunion task measuring attachment. Video footage of a free play session prior to the separation-reunion task was coded for behavioural inhibition using the BIM. Mothers completed the anxiety scale of the Symptoms Checklist 90-Revised (Derogatis, 1994) when participants were 14 years old. At 21 years of age, participants completed the Revised NEO Personality Inventory (Costa & McCrae, 1992), as a measure of

neuroticism and the Intolerance of Uncertainty scale short form (IUS-12; Carleton, Norton & Asmundson, 2007).

Attachment (specifically ambivalent and disorganized controlling types) and behavioural inhibition were both independently positively related to intolerance of uncertainty, a finding that remained after controlling for maternal anxiety and neuroticism. Attachment and BI had no interacting effect on the development of IU. Maternal anxiety was positively related to child BI and insecure attachment, but not to IU. This study is the first to empirically and longitudinally link the cognitive concept of intolerance of uncertainty to both ambivalent and disorganized controlling attachment patterns, as well as to behavioural inhibition. Thus results have not only etiological and preventative implications for generalized anxiety disorder but also for other disorders related to IU.

In summary, results from this thesis show that the BIM is a useful observational tool to study temperament, particularly as it can be rapidly added to existing data sets with video footage and provides substantial advantages over retrospective questionnaires. Furthermore, both childhood attachment and behavioural inhibition independently contribute to later psychopathology and their effects can be seen over a 15-year span. These results underline the contribution of early childhood individual and dyadic characteristics to later psychopathology and the need for both individual and family based early interventions.

Keywords: behavioural inhibition, attachment, internalizing problems, externalizing problems; intolerance of uncertainty.

CHAPTER I

INTRODUCTION

Early life experiences are proposed to be vitally important in shaping individual characteristics and development into adulthood. A major aim of developmental psychology has thus been to identify early childhood risk factors predictive of later psychopathology. Research of this kind is crucial for the development of effective intervention methods to reduce later disorders (Briggs-Gowan & Carter, 1998; Cicchetti & Toth, 1995). Individual and dyadic factors, such as temperament and the quality of the attachment relationship that the child develops with caregivers, have been theoretically associated with development of later behavioural problems and psychopathology (Bowlby, 1973; Cassidy, 1995; Hudson & Rapee, 2004). The behavioural inhibition temperamental profile has in particular been linked to both internalizing and externalizing behavioural problems and, most notably, to later anxiety disorders (Kagan, Reznick, & Snidman, 1987; Kagan, Snidman, Kahn & Towsley, 2007; Lonigan & Phillips, 2001). Attachment theory has also long been proposed as a theoretical framework with which to examine the development of problematic social and emotional adaptation as a function of early relationships, and individual differences in attachment have also been linked with internalizing and externalizing problems (Bolwby, 1973; Cassidy, 1995; Fearon, Bakermans-Kranenburg, van IJzendoorn, Lapsley, & Roisman, 2010; Groh, Roisman, van IJzendoorn, Bakermans-Kranenburg & Fearon, 2012; Moss, Rousseau, Parent, St-Laurent, & Saintonge, 1998; Moss, Smolla, Cyr, Dubois-Comtois, Mazzarello & Berthiaume, 2006).

Behavioural inhibition refers to a physiological predisposition for heightened reactions during unfamiliar or stressful situations, whereas attachment develops based on the history of interactions of a child and a caregiver since birth and the child's eventual expectations of the caregiver's responses to the child's needs, particularly in stressful

situations (Bowlby, 1969/1982; Kagan et al., 1987; Vaughn, Bost & van Ijzendoorn, 2008). Behavioural inhibition and attachment are fundamentally different and independent constructs, but they share some common underlying concepts, such as child reactivity, self-regulation and cognitive perceptions of uncertainty (discussed below), which link both to an increased risk of later psychopathology. This thesis makes two broad contributions: the development of a novel measure of behavioural inhibition and the examination of the predictive roles of behavioural inhibition and attachment in the development of psychopathology. In the first study, we develop a new observational measure of behavioural inhibition, coded from video segments of the Strange Situation procedure, and assess its construct validity by comparing it with both temperament questionnaires and an existing observational procedure from a well-established child development laboratory. We further validate the new measure by examining whether its predictions for internalizing and externalizing behaviour problems differ from those made using an attachment measure. The interactive contribution of behavioural inhibition and attachment on behaviour problems is also tested. In the second study, we adapt our new behavioural inhibition measure to an older cohort of children and examine the interactive and independent contributions of behavioural inhibition and attachment at preschool age to the development of intolerance of uncertainty in adulthood, a known risk factor for generalized anxiety disorder. Our overall aim is to establish how behavioural inhibition and attachment predict later psychopathology.

Assessment opportunities

Over the last four decades extensive research has established parent-child affective bonds as important factors in the child's development and later socio-emotional adaptation (Bowlby, 1969/1982). In the last 30 years, the quality of these affective bonds, represented in the parent-child attachment relationship, has been systematically researched and analyzed. Increased availability of recording devices and videotapes has made review and analysis of attachment behaviour accessible to child development researchers. The Ainsworth Strange Situation procedure (Ainsworth, Blehar, Waters & Wall, 1978), one of the most widely used observational laboratory-based measures (Fearon et al., 2010), was created to assess the quality of the child-caregiver attachment relationship. During this procedure, which resembles a waiting room situation, the caregiver and child wait in an unfamiliar room with

some toys, while an unfamiliar research assistant enters and attempts to interact with the child. The procedure involves two brief separations and reunions between the child and their caregiver in order to elicit a stress response from the child (Ainsworth et al., 1978). Although specially created to elicit, observe and measure specific attachment behaviours, researchers have also used the Strange Situation to measure other constructs or other aspects of attachment. For example, Lyons-Ruth and colleagues (2009) recently measured socially indiscriminant child attachment behaviours using videotaped sessions of the Strange Situation procedure. Socially indiscriminant behaviours include being overly friendly with strangers, seeking comfort from unfamiliar people and not appropriately affectively differentiating between known caregivers and strangers (Lyons-Ruth, Bureau, Riley, & Atlas-Corbett, 2009). Lyons-Ruth et al. (2009) were able to both code such behaviours from the Strange Situation procedure and assess the convergent and divergent validity of their measure by comparing it with Ainsworth's attachment classification system. They also showed that the measure was related to caregiver risk factors (such as maltreatment, psychiatric hospitalization and disrupted maternal communication) and child's future hostile and hyperactive behaviour problems. Furthermore, Dickstein and colleagues (1984) used one particular episode of the Strange Situation procedure, involving the presence of the stranger, to evaluate child individual differences in social referencing (i.e.: actively seeking cues from others) towards their mothers. They demonstrated that securely and insecurely attached children displayed different frequencies of social referencing behaviours (Dickstein, Thompson, Estes, Malkin & Lamb, 1984). Although most behaviours coded from the Strange Situation up to now have been related to the attachment construct, it is possible that other constructs, particularly those related to temperament, might also be measurable.

Child temperament, like attachment, is a construct that has been linked to later child socio-emotional development (Burgess, Marshall, Rubin, & Fox, 2003; Kagan et al., 2007). Temperament is defined as an affective, motivational and behavioural contruct that is biologically based, stable and behaviourally observable (Bates, Freeland & Lounsbury, 1979; Buss & Plomin, 1984; Goldsmith, Buss, Plomin, Rothbart, Thomas, Chess et al., 1987; Rothbart & Derryberry, 1981; Thomas, Chess, Birch & Hertzig, 1960). In order to quantify temperament, early work in this field typically observed children's behavioural reactions to

different stimuli and situations in their daily environment in order to identify individual differences in reactivity as well as stable and persistent patterns of behaviours (Thomas et al., 1960; Goldsmith et al., 1987). However, child temperament is now most often assessed by questionnaire (Buss & Plomin 1984; Gartstein & Rothbart, 2003; Putnam, Gartstein, & Rothbart, 2006, Sanson, Smart, Prior, Oberklaid, & Pedlow, 1994). Nonetheless, one temperament profile, behavioural inhibition, is still customarily studied with laboratory-based paradigms, but these procedures tend to not be as universally standardized as the Strange Situation (e.g.: Calkins & Fox 1992, 1994; Garcia-Coll, Kagan & Reznick, 1984; White, McDermott, Degnan, Henderson, & Fox, 2011). Behavioural inhibition is characterized by apprehensive reactions to the unfamiliar and a tendency to withdraw in the face of novel situations, objects or people (Garcia-Coll et al., 1984; Fox, Henderson, Rubin, Calkins & Schmidt, 2001; Kagan & Snidman, 2004; Stevenson-Hinde & Marshall, 1999). The Strange Situation procedure, which also involves novel situations, objects and an unfamiliar individual, may therefore be a useful paradigm in which to measure behavioural inhibition. Belsky & Rovine (1987) suggested that both attachment and temperament could be measured in the same paradigm (see also Goldberg, Blokland & Myhal, 2001).

Although attachment and behavioural inhibition may be measurable using the same paradigm, they are widely accepted as fundamentally independent constructs (Sroufe, 1985). In a comprehensive literature review, Vaughn, Bost & van IJzendoorn (2008) concluded that individual differences in attachment cannot be explained by temperamental constructs, regardless of the theoretical approaches to temperament; although modest associations between measures of attachment and temperament might be found when the measures emphasize affect expression. Therefore attachment and temperament can be individually identified. Attachment is considered to be a relational construct, observed in interactions between a child and their caregiver. On the other hand, temperament is considered to be an individual characteristic that is stable over time and across different circumstances (Sroufe, 1985). Even if fundamentally different constructs, behavioural inhibition and attachment have some similar underlying concepts (reactivity, regulation and perceived uncertainty) that can identify them as risk factors for behavioural problems and later psychopathology.

A systematic measurement of two important developmental constructs (ie.: attachment and behavioural inhibition) using the same procedure would be cost-effective and enable researchers to more easily examine the contribution of each to socio-emotional development in general and to particular disorders such as anxiety where both are presumed to contribute (Manassis & Bradley, 1994; Vasey & Dadds, 2001; Schieche & Spangler, 2005; Shamir-Essakow, Ungerer & Rapee, 2005).

Attachment

The quality of the relationship between caregiver and child plays an important developmental role and is predictive of adaptation (Bowlby, 1969/1982). A dysfunctional mother-child relationship has been proposed as a risk factor for later psychopathology (Bowlby, 1969/1982; 1973). Attachment theory stipulates that, in new and uncertain situations, the young child can use a primary caregiver, such as a parent, as a 'secure base' from which to explore the environment. When encountering a frightening or threatening situation, the child may react by seeking the physical proximity and comfort of the caregiver to reduce and regulate distress (Ainsworth et al., 1978; Goldberg, 2000). Through these experiences, the child acquires knowledge about not only the physical environment but also about the self (by learning to regulate distress) and others (by integrating the expected behaviours of others in response to the child's needs) (Main, Kaplan & Cassidy, 1985).

Individual differences observed in child behaviour in stressful situations depend, in part, on the child's interpretation of caregiver behaviour and the child's expectations of caregiver's responses to his/her needs for comfort and care (Bowlby, 1969/1982; Main et al., 1985; Bretherton, 1999; Bretherton & Munholland, 2008). The particular attachment behaviours developed by children are adaptive reactions to the caregiver's responses to the child's bids for proximity-seeking. For example, a caregiver can be sensitive to a child's needs and respond adequately with timely, warm, and predictable responses contingent on the child's behaviours. The caregiver thus helps the child reduce distress in stressful situations and aids the child in eventually regulating his own emotions (Bretherton, 1990). The child learns that the caregiver can be relied on in times of need for protection and emotional regulation, forming an internal model of the caregiver on the basis of the history of his or her

experiences (Bowlby 1969/1982; Ainsworth et al., 1978). The child will therefore develop a secure attachment that will in turn help in the development of the child's own regulation of arousal, first with the help of the parent in co-regulation of distress and helpful soothing, then eventually leading the child to self-regulate (Cassidy, 1994; Kopp, 1982; Thompson, 1994). However, if parental responses are for example unstable, inconsistent, systematically rejecting or frightening a child may not learn to adequately regulate distress. Such interactions may constitute a risk factor for insecure attachment with the caregiver (Bowlby 1969/1982; Ainsworth et al., 1978). Uncertainty about the availability of a caregiver can lead a child to constantly worry about their needs being adequately met (Bowlby, 1973; Cassidy, 1995; Dugas, Buhr & Ladouceur, 2004). In addition, lack of adequate self-regulation may contribute to diminished capacity of the child to control worry and interfere with proper functioning (Cassidy, 1995; Cassidy, Lichtenstein-Phelps, Sibrava, Thomas & Borkovec, 2009).

The cognitive schema of Intolerance of Uncertainty (IU), a tendency to react negatively to uncertain situations or events, has been related to worry throughout different developmental stages (adolescence, young adulthood and adulthood) (Dugas et al., 2004). Intolerance of uncertainty has mainly been documented in adults, particularly in patients with generalized anxiety disorder, but has also been linked to other disorders (Dugas, Gagnon, Ladouceur & Freeston, 1998; Dugas, Marchand & Ladouceur, 2005; Freeston, Rhéaume, Letarte, Dugas & Ladouceur, 1994). Lack of control during early childhood has been linked to intolerance of uncertainty. Chorpita & Barlow (1998) suggested that a lack of control in a child's environment or exposure to uncontrollable events can lead a child to worry and eventually interpret the world as uncontrollable and frightening. Specific types of attachment relationships, particularly those characterized by inconsistent, unavailable and unpredictable parenting or role-reversal in the parent-child dyad (discussed in Chapters 2 and 3), have been proposed as risk factors for the development of IU (Cassidy, 1995; Dugas et al., 2004). Therefore, differential reactions on the part of the caregiver and child, lack of adequate self-regulation and control, and high levels of uncertainty can lead to an increased risk of later psychopathology through an insecure attachment.

Behavioural inhibition

Behavioural inhibition refers to the tendency to withdraw in the face of novel situations, objects or people and to react with apprehension when faced with unfamiliar and uncertain situations (Calkins & Fox, 1992; Garcia-Coll et al., 1984; Fox et al., 2001; Kagan, 1989; Kagan & Snidman, 2004). More specifically, behavioural inhibition has been defined as a difficulty to control a vulnerability or an intolerance to uncertainty caused by unfamiliar stimuli (Degnan & Fox, 2007; Kagan, Snidman, Zentner & Peterson, 1999; Kagan & Snidman, 2004; Reznick, Gibbons, Johnston & McDonough, 1989). Having a low threshold for tolerating uncertainty, such as is suggested for behaviourally inhibited children, can lead to avoidance of uncertain or ambiguous situations in an attempt to control one's anxiety, with the effect that anxious symptoms are maintained (Manassis & Bradley, 1994; Vasey & Dadds, 2001). Behavioural inhibition could therefore be a risk factor for the development of the cognitive schema known as Intolerance of Uncertainty and has been linked to generalized anxiety disorder (Hudson & Rapee, 2004).

According to Kagan and colleagues (1988), from birth, behaviourally inhibited children require less intense stimuli to activate their sympathetic nervous system, commonly related to the fight or flight response, than do non-inhibited children (Kagan, 1999; Kagan, Reznick & Snidman, 1988; Kagan, Snidman & Arcus, 1993). These differences in reactivity are thought to be the primary mechanism linking behavioural inhibition with the development of behavioural problems (Kagan, 1999; Kagan et al., 1987, 1988). Although modulation of ongoing behaviours in response to stimuli emerges early in life (when children are 3 to 9 months old), it is only in the second and third year of life that self-control and self-regulation processes, such as attention, approach, avoidance, and inhibition, develop and allow conscious regulation of reactivity (Kopp, 1982, 1989; Feldman & Greenbaum, 1997; Lecuyer-Maus & Houck, 2002). Owing to their physiological vulnerability to react more rapidly or intensely, behaviourally inhibited children are at increased risk of reacting intensely to novel or uncertain situations before having developed self-regulation. In the first year of life, children's distress is initially managed or co-regulated by the caregiver (Thompson, 2001). If these children do not learn, through the help of a caregiver or otherwise, how to regulate their intense reactions to unfamiliarity, they may be at risk for

later adaptation problems. Diminishing their distress by avoiding uncertainty will reinforce their view that uncertainty and novelty are threatening and should be avoided, therefore maintaining this intolerance of uncertainty and increasing the risk for potential behavioural disorders (an issue explored in Chapter 3) (Vasey and Dadds, 2001; Lonigan & Phillips, 2001; Kagan, 1999). Uninhibited children, on the other hand, approach unfamiliar situations or people readily and are more easily drawn to novel social situations compared to inhibited children. However, they are also more prone to react more intensely and uncontrollably in frustrating situations (Rubin, Both, Zahn-Waxler, Cummings & Wilkinson, 1991). Extremely uninhibited children are at increased risk for impulsive behaviours such as entering in contact with strangers too rapidly, peer aggression and oppositional defiance (Biederman, Rosenbaum, Hirshfeld, Faraone, Bolduc, Gersten, et al., 1990; Burgess et al., 2003; Fox et al., 2001; Kagan et al., 1987, 1988; Pfeifer, Goldsmith, Davidson & Rickman, 2002; Rubin, Hastings, Chen, Stewart & McNichol, 1998; Schwartz, Snidman & Kagan, 1996). Therefore, both extreme inhibition and uninhibition carry risks.

In sum, both unavailable, inconsistent or frightening caregiving behaviour and heightened physiological reactivity to unfamiliarity may constitute developmental risk factors. Identification of both behavioural inhibition and attachment insecurity at an early age is thus important for prevention of later behavioural problems. Our main research objective is to investigate the roles of attachment and behavioural inhibition in relation to risk of later psychopathology. In order to facilitate future research on these two topics, we will also develop an observational measure of behavioural inhibition based on the Strange Situation that is easily generalizable and can be rapidly integrated in pre-existing and novel research projects.

Objectives and Potential Contribution

The first study (Chapter 2) aims to assess the independent and interactive contributions of infant behavioural inhibition and attachment to the development of behavioural problems, hypothesizing that behavioural inhibition will differentially predict internalizing and externalizing problems from attachment. The objective of Study 1 is to develop and validate a theory-based behavioural inhibition measure from behaviours

observed during the Strange Situation procedure, developing on previous work (Zdebik, 2006). We examine whether the new measure is (1) independent of attachment, (2) congruent with validated maternal report and non-caregiver report temperament questionnaires, (3) congruent with an existing gold-standard observational behavioural inhibition procedure (Fox et al., 2001; White et al., 2011). We then examine the independent and interactive contributions of behavioural inhibition and attachment to internalizing and externalizing behavioural problems. Study 1 contributes to the existing literature by providing a new validated and economical behavioural inhibition measure that can be rapidly integrated and coded in existing studies, as well as by extending understanding of the influence of behavioural inhibition and attachment on childhood behaviours problems.

Study 2 (Chapter 3) examines the etiology of intolerance of uncertainty, using a longitudinal design following children from 6 to 21 years of age. We hypothesize that insecure attachment and behavioural inhibition will predict later intolerance of uncertainty. We 1) adapt our newly developed and validated behavioural inhibition measure to an older population of children, 2) examine associations between children's behavioural inhibition and maternal anxiety, and, 3) examine the independent and interactive contributions of behavioural inhibition and attachment at preschool age to the development of intolerance of uncertainty in adulthood. This study will be the first to examine the association between childhood behavioural inhibition and attachment using observational measures and examining specific attachment subgroups as predictors of intolerance of uncertainty in adulthood, and this in a longitudinal design. It will not only add to the sparse literature on the etiology of intolerance of uncertainty, but could potentially aid in prevention and early treatment for disorders associated with this cognitive schema.

CHAPTER II

STUDY 1

Validation of a New Behavioural Inhibition Measure: Differential Predictive Validity of Behavioural Inhibition and Attachment in Internalizing and Externalizing Problems.

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Article to be submitted to *Attachment and Human Development*

This study was supported by grants and doctoral scholarships received from the Social Sciences and Humanities Research Council of Canada (SSHRC) and the Fonds Québécois de Recherche sur la Société et la Culture (FQSRC). We thank Jean Bégin for his valuable assistance in this research project.

Abstract

Behavioural inhibition has been linked to a number of psychopathologies, and new assessment methods would provide additional opportunities to investigate this important dimension of temperament. We developed an observational behavioural inhibition measure (BIM), based on the Ainsworth Strange Situation, validated it against both temperament questionnaires and well-established observational behavioural inhibition methodology (Fox et al., 2001), and compared its predictive validity for concurrent internalizing and externalizing behavioural problems with that of attachment. We used video footage of 77 18-month-old toddlers participating in the Strange Situation as part of a longitudinal study, coding children's reactions to an unfamiliar situation. Scores reflecting behavioural inhibition (BI) were calculated. The BIM 1) had strong inter-rater reliability, 2) had no association with attachment classification as measured by the Strange Situation, 3) moderately correlated with maternal reports on the Fear and Approach scales of the revised Infant Behaviour Questionnaire (IBQ-R), the Sociability scale of the Early Childhood Behaviour Questionnaire (ECBQ), as well as an in-home observational non-caregiver temperament questionnaire assessing shyness and sociability. The BIM was also compared to a well-established child development laboratory behavioural inhibition paradigm (CDL-BI) in a separate sample of 31 24-month-old toddlers. Results showed that the BIM strongly correlated with the CDL-BI, further validating the new measure. Finally, BIM scores predicted internalizing behavioural problems but not externalizing problems. In contrast, attachment classification predicted externalizing but not internalizing problems. No interaction effects were found between BI and attachment. Attachment and our new behavioural inhibition measure (BIM), although coded from the same paradigm, can thus provide differential predictive information for childhood internalizing and externalizing problems. The BIM may be a useful tool to study temperament, particularly as it can be rapidly and retrospectively utilized within existing studies with video data.

Keywords: behavioural inhibition, temperament, attachment, internalizing problems, externalizing problems

Introduction

Identifying childhood risk factors for later psychopathology has been a major focus of developmental psychology (Cicchetti & Toth 1995; Vasey & Dadds, 2001). Both a child's own characteristics, such as temperament, and the quality of the attachment relationship that the child develops with his caregiver have been identified as important early predictors of behavioural problems (Fearon, Bakermans-Kranenburg, van IJzendoorn, Lapsley & Roisman, 2010; Groh, Roisman, van IJzendoorn, Bakermans-Kranenburg & Fearon, 2012; Kagan, Reznick & Snidman, 1987; Kagan, Snidman, Kahn & Towsley, 2007; Lonigan & Phillips, 2001; Moss, Smolla, Cyr, Dubois-Comtois, Mazzarello & Berthiaume, 2006). Behavioural inhibition, a well-studied temperamental profile, has been repeatedly linked to internalizing (anxiety, social withdrawal, depression) and externalizing (e.g.: peer aggression, conduct disorder, oppositional defiance) behavioural problems (Biederman, Rosenbaum, Chaloff & Kagan, 1995; Burgess, Marshall, Rubin & Fox, 2003; Kagan et al., 1987). Similarly, risk of developing later internalizing and externalizing behavioural problems has been linked to insecure attachment, with disorganized attachment being most strongly linked to later psychopathology (Moss, Cyr & Dubois-Comtois, 2004; Moss et al., 2006; NICHD Early Child Care Research Network, 2004; O'Connor, Bureau, McCartney & Lyons-Ruth, 2011; van IJzendoorn, Schuengel & Bakermans-Kranenburg, 1999). In recent years, efforts to develop increasingly integrated multidimensional etiological models of psychopathology have begun to re-examine the combined effects of attachment and behavioural inhibition on later development (Bohlin, Hagekull & Andersson, 2005; Burgess et al., 2003; Manassis & Bradley, 1994; Muris & Meesters, 2002; Shamir-Essakow, Ungerer & Rapee, 2005; van Brakel, Muris, Bögels & Thomassen, 2006; Warren, Huston, Egeland & Stroufe, 1997).

For the past 35 years, the gold-standard for measuring infant attachment has been the Ainsworth Strange Situation procedure (SSP; Ainsworth, Blehar, Waters & Wall, 1978). The SSP is a standardized stress-inducing videotaped protocol consisting of a series of separations and reunions (detailed in methods section) resembling a waiting room situation involving two brief separations and reunions between the mother and the child. The protocol is conducted in an unfamiliar room with toys, where a stranger enters and attempts to interact with the child

(Ainsworth et al., 1978). Although no single standardized equivalent to the SSP exists for measuring behavioural inhibition (BI), observational behavioural laboratory-based measures are also used for measuring BI (Fox, Henderson, Rubin, Calkins & Schmidt, 2001; Garcia-Coll, Kagan & Reznick, 1984; Kagan, Snidman, Zentner & Peterson, 1999). Since behavioural inhibition is characterized by reactions to the unfamiliar, these measures (detailed below) assess behavioural and emotional reactions to unfamiliar individuals, novel objects and uncertain situations or events. Observational measures of BI are generally preferred to parent-report or retrospective questionnaires in order to minimize assessment bias (Kagan & Snidman, 2004; Kagan, Snidman & Arcus, 1993; Lonigan & Phillips, 2001). However, existing protocols require considerable time and when coupled with participation in other measures, may lead to overburdened participants and contribute to attrition, particularly in long-term longitudinal studies. There is thus a need for rapidly administered and objective observational measures of BI (Warren & Dadson, 2001). The Strange Situation procedure (Ainsworth et al., 1978) has components similar to those used in BI paradigms (e.g.: Garcia-Coll et al., 1984; Fox et al., 2001) and therefore, it may also be an acceptable paradigm for measuring behavioural inhibition. Moreover, creating a new measure based on an existing protocol used for several decades to measure attachment (also considered an important predictor for later behavioural problems) would enable the addition of valuable childhood temperament information to pre-existing data-sets.

Behavioural inhibition: a risk factor for behavioural problems

Behavioural inhibition is a temperament profile that refers to reactions to the unfamiliar and a tendency to withdraw in the face of novel situations, objects or people (Calkins & Fox 1992, 1994; Garcia-Coll et al., 1984; Fox et al., 2001; Kagan, 2000; Kagan, Reznick & Gibbons, 1989; Kagan, Reznick & Snidman, 1988; Kagan & Saudino 2001; Stevenson-Hinde & Marshall 1999). It encompasses both physiological reactivity and self-regulation (Goldsmith & Campos, 1990; Rothbart & DerryBerry, 1981). Physiological reactivity, the intensity and duration of activation of the nervous system, can be evaluated through behavioural, affective and endocrine responses in relation to a threshold of activation. 'Self-regulation' processes, such as attention, approach, avoidance, and inhibition, develop in the third year of life and allow regulation of reactivity (Kopp, 1982, 1989;

Lecuyer-Maus & Houck, 2002). Therefore, a child can not only react differently (in terms of latency, intensity, frequency and duration) to a given stimulus, but can also differentially modulate these reactions (for example, by inhibiting them or not).

According to Kagan and colleagues (1999), from birth onwards, the sympathetic nervous system of inhibited children, commonly related to the fight or flight response, has a lower activation threshold compared with that of non-inhibited children. Thus, less intense stimuli are required to activate the sympathetic nervous systems of inhibited children than is the case for non-inhibited children, and vice versa (Kagan, 1999; Kagan et al., 1993). Such differences in activation thresholds are thought to be the primary mechanisms linking behavioural inhibition with behavioural problems (Kagan, 1999; Kagan et al., 1987, 1988). A physiological vulnerability from birth to react more rapidly or intensively (i.e. a lower sympathetic activation threshold) may lead behaviourally inhibited children to be at increased risk to react intensely to novel situations or stimuli before having developed self-regulation and may lead to maladaptation. In early childhood, it is proposed to be through external influences such as through the caregiver's assistance in managing arousal and emotions that a child eventually learns to self-regulate (Thompson, 2001). If these children do not learn how to regulate their reactions to unfamiliarity, they may be at risk for later adaptation problems (Kagan & Snidman, 2004; Mount, Crockenberg, Bárrig Jó & Wagar, 2010). They may therefore, use such coping strategies as avoidance to reduce their arousal or distress and hence tend to avoid novel situations in early life, curbing habituation to such situations, maintaining these behaviours and being at risk of developing behavioural disorders such as internalizing problems (Vasey & Dadds, 2001; Manassis, Hudson, Webb & Albano, 2004; Lonigan & Phillips, 2001; Kagan, 1999). For example, behavioural inhibition has been associated with stress regulation problems, such as elevated heart rate (indicating activation of the sympathetic nervous system) and elevated cortisol secretion when compared to non-inhibited children (Gunnar, 1994, 2001; Kagan et al., 1987, 1988). Increased stress reactivity has been linked to internalizing problems (Kagan et al., 2007; Keuler, Schmidt, Van Hulle, Lemery-Chalfant & Goldsmith, 2011). Furthermore, high levels of behavioural inhibition itself have been established as an important risk factor for internalizing behavioural problems and anxiety disorders (Biederman et al., 1995; Crockenberg & Leerkes 2006; Hudson &

Rapee, 2004; Kagan et al., 1999; Rubin, Coplan & Bowker, 2009; Shamir-Essakow et al., 2005). In comparison with inhibited children, uninhibited children show high levels of approach behaviours and low levels of withdrawal when faced with unfamiliar stimuli. They more readily interact and are drawn to novel social situations, but are also more prone to react more intensely and uncontrollably if these situations frustrate them (Rubin, Both, Zahn-Waxler, Cummings & Wilkinson, 1991). Extremely uninhibited children display impulsive behaviours or enter too rapidly into contact with strangers or novel situations (Fox et al., 2001; Kagan et al., 1987, 1988; Pfeifer, Goldsmith, Davidson & Rickman, 2002). They are also at increased risk of developing externalizing behavioural problems, such as peer aggression and oppositional defiance disorder (Biederman, Rosenbaum, Hirshfeld, Faraone, Bolduc, Gersten et al., 1990; Burgess et al., 2003; Schwartz, Snidman & Kagan, 1996; Rubin, Hastings, Chen, Stewart & McNichol, 1998). Identifying extremes of behavioural inhibition at an early age can be an important tool in preventing later behavioural problems.

Measuring behavioural inhibition

Behaviourally inhibited children are often described as shy or timid (Burgess et al., 2003; Calkins & Fox, 1992; Hirshfeld, Rosenbaum, Biederman, Bolduc, Faraone, Snidman, et al., 1992; Kagan, 1999; Kagan et al., 1987, 1988; Pfeifer et al., 2002). In unfamiliar or novel situations or in the presence of strangers, inhibited children display introverted behaviours such as apprehension, withdrawal, cessation or interruption of vocalizations or activities as well as negative affect such as fretting, crying or sobbing. In experimental observations, these children typically have longer latency for exploring their environment, tend to stay close to their parents, and speak and play less compared with more outgoing children (Garcia-Coll et al., 1984; Kagan et al., 1987, 1988). On the other hand, uninhibited children are described as outgoing, bold, sociable, assertive, spontaneous and talkative. They explore and approach novel situations and play with novel toys more readily (Garcia-Coll et al., 1984; Fox et al., 2001; Kagan, 1999; Kagan et al., 1993; Schwartz, Snidman & Kagan, 1999). These differences in behaviour provide opportunities for measurement of inhibition via observational studies.

Although behaviourally inhibited and uninhibited children seem to be on a behavioural continuum, the extremes of both these types have been typically viewed as categorically distinct, and researchers have argued that they are related to underlying physiological differences linked to reactivity (Kagan et al., 1987, 1988). It is estimated that 10 to 15% of children are either inhibited or uninhibited (Garcia-Coll et al., 1984). For this reason, influential longitudinal studies of behavioural inhibition have tended to preselect children on these two extreme profiles using a variety of methods such as temperament questionnaires, parental telephone interviews, or laboratory based tests of behavioural reactivity to novel stimuli in infancy (Calkins, Fox & Marshall, 1996; Garcia-Coll et al., 1984; Fox et al., 2001; Kagan & Snidman, 1991; Moehler, Kagan, Oelkers-Ax, Brunner, Poustka, Haffner et al., 2008). For example, Kagan and colleagues (1984), in a longitudinal study, preselected 22-month old children prior to the laboratory visit by a telephone interview with their mothers based on the approach-withdrawal questions of the Toddler Temperament scale (Fuller, McDevitt & Carey, 1978). Once having identified children in the extreme groups of inhibition, their behavioural inhibition was then observationally measured in a laboratory setting resembling a 'waiting room' situation.

Typical observational behavioural inhibition measurement methods are similar to the Strange Situation procedure. Both use a testing area consisting of a room with a chair for the mother and age-appropriate toys for the child (Garcia-Coll et al., 1984). In both paradigms, the mother is asked not to interact with her child unless the child initiates the interaction. While the mother is in the room, the child is exposed to an unfamiliar research assistant as well as to uncertain events to elicit anxious reactions. For example, Kagan and colleagues (1984) used several different episodes: a free play episode, where the child could explore the room and toys; a modeling episode where an experimenter asks the child to model different scenarios with selected toys; a stranger episode, where an unfamiliar research assistant initially sits in the room quietly and eventually asks the child to interact and do a task; an unfamiliar object episode, where the child is encouraged to interact with a large loud robot; and finally, a separation episode where the mother leaves the room while the child remains with the experimenter. Behaviours such as apprehension, withdrawal, long latencies to approach objects or unfamiliar individuals, crying and sobbing, vocalizations and facial

expressions of distress, lack of play and proximity to the mother are recorded. Inhibition scores are assigned based on the number of inhibited behaviours the child displays. In other well-known longitudinal studies, children are preselected on the basis of physiological reactions to novel stimuli (Calkins et al., 1996; Kagan & Snidman, 1991). Then, similar testing contexts are used to elicit and score behavioural inhibition such as free play with novel toys, interaction with an unfamiliar research assistant and exposure to a loud toy robot. Measuring both behaviours related to the presence of behavioural inhibition (e.g.: staying in proximity to the mother) and behaviours related to lack of inhibition (e.g.: frequency of vocalizations, positive affect) is recommended to capture the full range of behavioural inhibition in children (van Brakel, Muris & Bögels, 2004; Reznick, Gibbons, Johnston & McDonough, 1989).

These observational methods are very useful in cases where behavioural inhibition is studied from the outset and pre-selection ensures that sufficient numbers of inhibited and uninhibited children enter the study. Moreover, researchers can add additional measurements and study these valuable cohorts longitudinally (Biederman, Rosenbaum, Bolduc-Murphy, Faraone, Chaloff, Hirshfeld et al., 1993; Hirshfeld et al., 1992). However, these methods also carry some disadvantages. For example, pre-selection does not allow for the full range of variation in behavioural inhibition to be studied. Studying the full range, and not only the extremes of behavioural inhibition, could address the clinical relevance of identifying BI in the general population (Reznick et al., 1989). Even without a pre-selection phase, these protocols are time consuming, costly and impossible to add in retrospect to ongoing studies. Up to now, such methods have been rarely used with specific populations of clinical interest. A common behavioural procedure for measuring attachment and temperament would be cost effective, facilitate use with diverse populations, and be less subject to bias than parent report questionnaires, or self-report retrospective questionnaires given at later stages of a study (Bishop, Spence & McDonald, 2003; Kagan et al., 1993; Lonigan & Phillips, 2001; Muris, Meesters & Spinder, 2003; Oosterman & Schuengel, 2007).

Temperament questionnaires such as the Infant Behaviour Questionnaire (Rothbart, 1981) or subscales of questionnaires (e.g.: Toddler Temperament Scale, TTS: Fullard et al.,

1978) have frequently been used to corroborate measured behavioural inhibition or as BI measurements themselves (Calkins et al., 1996; Garcia-Coll et al., 1984; Fox et al., 2001; Muris & Meesters, 2002, Muris, van Brakel Arntz & Schouten, 2011, Scheiche & Spangler, 2005, van Brakel, Muris & Derks, 2006). The most commonly reported temperament subscales associated with behavioural inhibition are approach, withdrawal, fear, shyness, sociability, emotional positivity and negativity (Burgess et al., 2003; Calkins et al., 1996; Garcia-Coll et al., 1984; Fox et al., 2001; Kagan et al., 1987; Pfeifer et al., 2002; Shamir-Essakow, Ungerer & Safier, 2004). Using temperament questionnaires, inhibited children were rated less likely to approach and more likely to withdraw from unfamiliar situations (Garcia-Coll et al., 1984) and uninhibited children demonstrated higher sociability and approach behaviour (Fox et al., 2001). Furthermore, higher scores on fear and shyness scales and lower social scores reflected more pronounced inhibited behaviour in children (Calkins & Fox, 1992; Calkins et al., 1996; Fox et al., 2001; Pfeifer et al., 2002).

Finally, there is considerable variation between studies in the way behavioural inhibition measurements are operationalized or coded. For example, in some studies children are observed individually in unfamiliar settings, while in others, they are tested with peers their own age (Kagan et al., 1987; Reznick et al., 1989). Some studies measure observed behaviours in terms of frequency of occurrence or in terms of duration, and others measure behaviours for intensity on Likert type scales (Fox et al., 2001; Kagan et al., 2007; van Bakel & Riksen-Walraven, 2004; White, McDermott, Degnan, Henderson & Fox, 2011). Attempts have been made to standardize observational procedures, but these have not been widely adopted and require participants to attend a lengthy laboratory session (Gagne, Van Hulle, Aksan, Essex & Goldsmith, 2011; Goldsmith, Reilly, Lemery, Longley & Prescott, 1993). Ideally, behavioural inhibition would be measured using the same behaviours across studies in the same manner in a standardized context, although it may be necessary to adjust procedures to the age of children under study.

Attachment: a possible paradigm for measuring behavioural inhibition

As discussed earlier, behavioural inhibition is most easily observed in unfamiliar situations involving novel objects, places or unfamiliar individuals. These elements are

present in the Ainsworth Strange Situation (Ainsworth, et al., 1978), the gold-standard measure of infant attachment. The Strange Situation procedure (SSP; detailed in methods section) is the most widely-used measure of infant attachment (Fearon et al., 2010; Solomon & George, 2008). It involves a waiting room-like situation where the child is free to explore a novel room and toys with his mother in the room, while an unfamiliar individual is introduced to the situation and the child's mother is asked to leave the room on two occasions. As previously mentioned, many currently used BI measures have components closely resembling this well-known, well-established procedure (Buss, Davidson, Kalin & Goldsmith, 2004; Calkins & Fox, 1992; Calkins et al., 1996; Garcia-Coll et al., 1984; Fox et al., 2001; Kagan, 1999; Schwartz et al., 1999; Shamir-Essakow et al., 2005).

Since the 1970s, a large number of studies have used the Strange Situation procedure to evaluate attachment patterns of parents and their offspring. Furthermore, most, if not all, Strange Situation procedures are videotaped and may be coded or reviewed at a later date (Donovan & Leavitt 1985; Goldberg 2000, 2001; Moss et al., 2004, 2006; Shamir-Essakow et al., 2005). Creating a paradigm that could measure behavioural inhibition from the SSP would enable the addition of vital information on childhood temperament to longitudinal studies already using the Strange Situation, thus expanding the possibilities of analysis with already well-studied cohorts. For example, this methodology could be valuable in the case of longitudinal studies where populations were assessed and videotaped during the Strange Situation in their childhood, then followed-up as adults and assessed for diverse psychopathologies, in order to add an early temperament measure. Such a method would likely be more powerful than retrospective questionnaires attempting to determine the participant's childhood temperament. Furthermore, attachment has been assessed in different populations in order to study later psychosocial development (Lyons-Ruth, Easterbrooks & Cibelli, 1997; Moss et al., 2004; Moss, Dubois-Comtois, Cyr, Tarabulsy, St-Laurent & Bernier, 2011). Therefore, adding a temperamental dimension to these specific populations, as an additional factor to examine within the described associations, would be a significant advantage. Furthermore, the SSP capture a breadth of behaviours and therefore has been used to measure other concepts such as social referencing, social approach and socially indiscriminant attachment behaviours (Dickstein, Thompson, Estes, Malkin & Lamb, 1984;

Lyons-Ruth, Bureau, Riley & Atlas-Corbett, 2009; Pierrehumbert, Miljkovitch, Plancherel, Halfon, & Ansermet, 2000).

The Strange Situation procedure was designed to assess the quality of the caregiver-offspring affective bond, known as attachment, during stressful events, such as a separation (Ainsworth et al., 1978). This affective bond typically forms between the child and a significant adult (generally the parent) during the first year of childhood (Bowlby, 1969/1982). Bowlby (1969/1982; Belsky, 1999) describes attachment as a biological system that, when activated by a real or apparent stressful or threatening situation, promotes proximity seeking behaviours. When no longer in a stressful or dangerous situation, the child can go back to explore his social or physical environment. To facilitate information acquisition and overall development, the child seeks to explore the environment using the parent as a 'secure base' for protection in order to increase chances of survival (Bretherton, 1985, 1990, 1999). In new and uncertain situations or during stressful or threatening events, the child seeks physical proximity and the comfort of a parent to diminish psychological distress or to avoid physical danger (Ainsworth, et al., 1978; Bowlby, 1969/1989; Goldberg, 2000). The concepts of proximity seeking in uncertain and threatening situations, distress and self-regulation, are found in both behavioural inhibition and attachment theory. Since the same paradigm will be used to assess these two different constructs it is vital that a new behavioural inhibition measure provides information independent of attachment. It is therefore important to understand how attachment is defined and also seen as a risk for later behavioural problems.

Individual differences observed in a child's behaviour in situations of stress depend, in part, on the child's interpretation of his caregiver's behaviour and on his expectation of the caregiver's responses to his needs for comfort and care (Bretherton, 1985, 1990; Main, Kaplan & Cassidy, 1985). Since each parent can also respond in a different manner to the needs of a child, the child adapts his behaviours to those observed in his caregiver and develops an attachment pattern associated to his caregiver's reactions. For example, a parent can be sensitive to his child's needs and respond adequately with timely, warm, and predictable responses contingent on the child's behaviours. This will help the child form a

representation of a parent who will reliably help the child regulate his emotions and comfort him when he needs it (Bowlby, 1969/1982; Main et al., 1985). This will also help the child to reduce his distress in stressful situations and develop a sense of competence in his own capacities to self-regulate. In such a case, the child will develop a secure caregiver attachment. However, if a child cannot count on the stability or consistency of his caregiver's responses to his needs, he may not be able to regulate his distress. This could lead to a general sense of insecurity in his relationship and will put the child at risk to develop an insecure attachment. Such individual differences in attachment behaviours can be measured with the use of the Strange Situation procedure.

Three attachment patterns were initially identified in infancy: secure (B), insecure-avoidant (A) and insecure-ambivalent (C) attachment (Ainsworth, et al., 1978). In general, children that view their parent as accessible and sensitive to their physical and emotional needs develop an organized and secure attachment. A secure attachment is least associated with behavioural problems (Fearon et al., 2010; Groh et al., 2012; Moss, Rousseau, Parent, St-Laurent, & Saintonge, 1998; Moss et al., 2006; Weinfield, Sroufe, Egeland & Carlson, 1999). Children that tend to develop an insecure-avoidant attachment typically have parents that are less sensitive to their child's emotional state and distress, and show more rejection behaviours towards their child compared to parents of secure children (Ainsworth et al., 1978; Bowlby, 1969/1982; Bretherton, 1985). The child therefore develops a representation of the parent as inaccessible and rejecting. In order to increase chance of proximity to the parent and diminish rejection, the child develops an avoidant attachment by minimizing his distress behaviours. In stressful or threatening situations these children have elevated heart rate and cortisol reactions but, on a behavioural level, they appear calmer than their secure peers (Spangler & Grossmann, 1993). Children with insensitive parents, who show inconsistent, unpredictable behaviours, are at risk of developing an ambivalent attachment. In order to increase chances for proximity with their parent, children maximize their distress behaviours in order to attract the parental attention (Ainsworth et al., 1978; Bowlby 1969/1982; Bretherton, 1985).

Although not optimal, insecure attachment patterns, like the secure attachment type, are considered adaptive and organized in relation to the parent's behaviours. However, some children display unusual, conflicting or disoriented behaviours during the Strange Situation procedure, such as stereotyped behaviours, freezing in place or being in a trance-like state. During a reunion with their parent, these children show apprehension or unusual behaviours such as hiding their face with their hands, crying and falling on the floor, being frightened or surprised when the parent enters the room, or displaying conflicting behaviours such as approaching and immediately withdrawing from the parent or attempting to leave the room (Main & Solomon, 1986). These observations lead Main & Solomon (1990) to add a fourth attachment classification: insecure-disorganized (D). Disorganized attachment is characterized by the absence of a coherent strategy to regulate comfort seeking behaviours in situations of stress. When the caregiver is extremely insensitive and simultaneously a source of security and of fear and anxiety to the child, such as in abusive families, the quality of the parent-child bond is severely affected and is thought to lead to the development of a disorganized attachment (Lyons-Ruth & Jacobvitz, 1999; Main & Solomon, 1990; Moss et al., 2004). These children develop expectations of others that reflect mistrust and hostility in relationships and interactions, which are associated with aggressivity in children (Moss, Bureau, St-Laurent & Tarabulsy, 2011).

Regarding behavioural problems, insecure children (avoidant and ambivalent) are more at risk of developing internalizing and externalizing behavioural problems at preschool age, school age and even in adolescence than are securely attached children (Burgess et al., 2003; Weinfield et al., 1999). However, disorganized children are most at risk of developing behavioural problems compared to all other attachment types (Carlson, 1998; Fearon et al., 2010; Moss et al., 2006). Lyons-Ruth and colleagues (1997) demonstrated that children with a disorganized attachment in early childhood had high levels of externalizing behavioural problems at 7 years-old. The impact of disorganized attachment can also be observed in adolescence. Disorganized attachment is associated with a higher risk of externalizing behaviours, aggression towards peers and suicide, as well as a higher risk of internalizing and dissociative behaviours and later psychopathology (Carlson, 1998; Lyons-Ruth, 1996). Recent meta-analyses found that insecure and disorganized attachment were more strongly

associated to externalizing than internalizing symptoms (Groh et al., 2012) and that disorganized children seemed to be at greater risk for externalizing problems compared to children with secure, ambivalent and avoidant attachment (Fearon et al., 2010). Although attachment patterns are mainly discussed and coded in categorical terms, attachment can be viewed as a continuum from secure to insecure to disorganized attachment as the risk of behavioural problems increases. Some researchers have argued that attachment can be scored continuously and may be more consistent with a continuous than categorical representation (Fraley & Spieker, 2003; Kochanska, 1998; Richters, Waters & Vaughn, 1988).

Attachment and behavioural inhibition: effects on later outcomes.

Integrative developmental psychopathology models suggest independent and interactive effects between BI and attachment on later behavioural problems (Manassis & Bradley, 1994; Vasey & Dadds, 2001). Several studies have documented such effects (Bohlin et al., 2005; Muris & Meesters, 2002; Muris et al., 2011; Nachmias, Gunnar, Mangelsdorf, Parritz & Buss, 1996; Schieche & Spangler, 2005; Shamir-Essakow et al., 2005; Spangler & Schieche, 1998; van Brakel et al., 2006). However, inconsistent results have been found, especially regarding interactive effects (see Vaughn, Bost & van Ijzendoorn, 2008). For example, Muris & Meester (2002) showed in adolescents that high levels of BI and an insecure attachment contributed independently to anxiety symptoms. In contrast, Muris et al. (2011) found that children aged between 5 and 8 years-old high on behavioral inhibition and who were insecurely attached presented with the highest levels of anxiety symptoms in a two year follow-up, whereas children who were classified as low on inhibition and as securely attached presented with the lowest anxiety levels, suggesting interactive effects. Children identified as uninhibited have been shown to be at risk for externalizing problems and Burgess and colleagues (2003) showed an interaction between infant behavioural inhibition and insecure-avoidant attachment, where the most uninhibited children with an avoidant attachment were most at risk for externalizing behavioural problems at 4 years-old. However, multiple studies have failed to demonstrate such interaction effects (Muris & Meester, 2002; Shamir-Essakow et al., 2005; see Vaughn et al., 2008). Creating a measure of behavioural inhibition from a measure that already assesses attachment will allow researchers to easily

examine not only independent effects but also interaction effects of these two important predictors of later child development.

Finally, although attachment, just as behavioural inhibition, involves reactivity and self-regulation linked to the development of behavioural problems, BI and attachment are said to be fundamentally different and independent concepts (reviewed in Sroufe, 1985; Vaughn et al., 2008). Attachment is viewed as a 'dyadic behavioural organization' formed within the child-caregiver relationship, whereas, temperament is seen as 'individual behavioural dimensions' (see Sroufe, 1985, p.12). Attachment develops in the first year of life through the integration of expectations of reactions of others to one's needs in stressful situations, whereas behavioural inhibition is seen as a physiological predisposition to heightened reactions to unfamiliar or stressful situations. Nonetheless, if we are to use the same paradigm to measure similar behaviours to code different concepts, it is crucial to verify if the final measures are independent from each other.

Objectives and hypotheses

As multidisciplinary longitudinal collaborations increase, being able to add measures of behavioural inhibition to ongoing research without either compromising it or overburdening participants would be valuable. The objective of this study was to validate a new behavioural inhibition measure (BIM), based on video footage of the Strange Situation procedure and this was carried out in 3 parts. Part 1: Once a theory-based behavioural inhibition score was identified from video footage of the reactions of 18 month old toddlers to an unfamiliar situation, the BIM's convergent and divergent validity was examined to test if it was independent of attachment and congruent with validated maternal report and non-caregiver report temperament questionnaires. We expected that the BIM would be independent of attachment classification. We predicted that children scoring higher on inhibited behaviours as assessed with the BIM will have higher scores on related temperament constructs such as fear and shyness and have lower scores on constructs such as approach and sociability. We also examined if these predictions would hold for a non-caregiver report temperament questionnaire assessing behaviours associated with shyness and sociability. Furthermore, we predicted that other temperament constructs that have not been

associated with behavioural inhibition, such as cuddliness, would not be associated with scores on the BIM.

Part 2: The convergent validity of the BIM was assessed with a well-established observational behavioural inhibition measure (Fox et al., 2001; White et al., 2011) using video footage from another laboratory of two year-old children in an unfamiliar situation. We expected behavioural inhibition measured with the BIM to be related to the behavioural inhibition scores measured with the well-established measure.

Part 3: Issues of clinical relevance were addressed, specifically childhood behavioural problems. We examined the independent and interactive contribution of behavioural inhibition (measured with the BIM) and attachment (measured with the Strange Situation) to the development of internalizing and externalizing child behavioural problems in the original sample of 18 month old children. We predicted that children with higher behaviour inhibition scores will have more internalizing behaviours, while those with lower scores will score more highly on externalizing behaviours. We also examined if our measure predicted internalizing and externalizing behavioural scores differently to the attachment classification scores. No specific hypothesis was made for the possible interactive effect of BI and attachment on internalizing problems given the conflicting results in the literature. We thus hoped to create a useful new measure of inhibition from an established and widely used paradigm, and to demonstrate the utility of this measure in predicting indicators of behavioural risk in children. Results of all three parts are discussed together.

Part 1: Development and convergent and divergent validity of the BIM

Methods

Participants

Participants in the current study were 77 infants and their mothers taking part in an ongoing longitudinal study, the *Maternal Adversity, Vulnerability and Neurodevelopment* (MAVAN) project that examines the effects of pre and postnatal environmental adversity on

children's socio-emotional and cognitive development. MAVAN participants were recruited, through their participation in the Montreal Prematurity Study (Koren, Blanchette, Lubetzky & Kramer, 2008), from four large hospitals in diverse socioeconomic areas of Montreal in order to have a representative sample of the general population. Only children born full term (37 weeks gestation and over) and not admitted to the neonatal intensive care unit for any time were included in the present study. One child per mother took part in the present study, and mothers were eighteen years of age or older (mean age = 27.90 years, *SD* = 5.23) at initial recruitment during the first trimester of pregnancy. Mothers had to be fluent in either English or French to participate. Part of the sample of children was selected according to low birth weight as an indicator of prenatal adversity and defined as 'at risk' infants in accordance with the main objective of the MAVAN project. Children were considered born small for gestational age (SGA) if their weight at birth was below the 10th percentile for gestational age according to gender, based on the New and Improved Population-Based Canadian Reference for Birth Weight for Gestational Age (Kramer, Platt, Wen, Joseph, Allen, Abrahamowicz, et al., 2001). Control infants' weights were between the 40th and 70th percentile (inclusive) for gestational age. During recruitment, each SGA child was typically matched with two control children born appropriate for gestational age (AGA) according to sex and birth date. In order to ensure a broad sample of the population, the two control children were chosen to be of varying socioeconomic status (SES). SES was based on family income and maternal education.

Only participating infant-mother dyads that completed the videotaped session of the Strange Situation procedure at 18 months of age were included in the present study. For the 77 dyads whose videos were available for coding, child (female n=42) mean age was 18.37 months (*SD*= 0.37). Seventeen infants were born SGA (female n=7, male n=10). Birth weight as well as gestational age of the children were normally distributed with a mean weight of 3.20 kg (*SD* =.40) and an average of 39.67 weeks (*SD*= 1.09) gestational age. The sample was heterogeneous with respect to yearly household income level, with 10.3% of families earning less than $20,000 CAD, 35.3% earning between $20,000 and $50,000, 42.6% earning between $50,000 and $100,000, and 11.8% earning above $100,000. Maternal education was distributed as follows: 15.6% of mothers had received a high school diploma or less

schooling, 41.6% completed post-secondary college or some university, and 42.9% had completed a university degree. Sixty-five percent of mothers were native French speaking.

Due to a procedural delay, 27 of the 77 children were not tested on all measures at the first time point of the study (T1: children 6 months of age), whereas all 77 children were tested at the second time point (T2: children 18 months of age). No significant differences were found between the dyads present at T1 and T2 (N=50) and those with missing data at T1 (N=27) on demographic measures (maternal age: $t(1, 75) = 0.67$, $p = .50$, socioeconomic status: $\chi^2 (2, N = 68) = 1.36$, $p = .51$), child gender ($\chi^2 (1, N = 77) = 1.71$, $p = .19$), birth size ($\chi^2 (1, N = 77) = 1.38$, $p = .24$), birth weight ($t(1, 75) = 0.66$, $p = .51$) or weeks gestation ($t(1, 75) = 0.21$, $p = .83$).

General procedures

Participants were sent a letter explaining the research protocol which requested their participation with their child. Mothers who agreed to participate were contacted by telephone to schedule the first visit. Maternal information such as date of birth, income and education was collected prenatally by the Montreal Prematurity Study. Data was collected from both mother and infant when the child was 6 (T1) and 18 months (T2) of age. Each time point consisted of two home visits by female research assistants and a third laboratory visit. Only part of the collected measures was used in the current study. The duration of each visit was approximately 90 minutes and mothers were compensated $25 for their participation in each visit.

Time point 1, T1. A month before the children turned 6 months of age, a first visit was arranged with the mother to conduct a semi-structured interview regarding the mother and child's general health and well-being. The mother also completed the Infant Behaviour Questionnaire-Revised (IBQ-R; Gartstein & Rothbart, 2003) during this visit. The second home visit was arranged at a time of day at which the baby was most active in order to facilitate collection of behavioural and observational measures. The mother also completed questionnaires during this visit. The third visit was held at the Douglas Institute's laboratory. Data from the second and third T1 assessment were not used in this study.

Time point 2, T2. The T2 procedure for the two home visits was similar to that of T1. Due to the large amount of measures collected, two research assistants visited the home on the first occasion. Child temperament was assessed by the research assistants using the Non-caregiver observational temperament scale (N-COTA; Zdebik, 2006), while observing the child's behaviour during the entire first home visit. During this visit, the mother filled out several questionnaires, child behavioural and physiological measures were collected and the dyad participated in a free play interaction with novel toys. The mother completed the Early Childhood Behaviour Questionnaire (ECBQ; Putnam et al., 2006) during the second home visit. The Strange Situation procedure (SSP; Ainsworth, et al., 1978) was administered during the laboratory visit (see 'Instruments', below). After being briefed on the procedure, the mother and child were invited to a room, akin to a waiting room, containing two chairs, a table with magazine and a rug with age appropriate toys for the child. Following the SSP, the mother filled out questionnaires, including the Infant-Toddler Social and Emotional Assessment (ITSEA; Briggs-Gowan & Carter, 1998).

Instruments

Attachment: Attachment was assessed when the child was 18 months of age (T2), using the Ainsworth Strange Situation procedure (SSP), a videotaped standardized 21 minutes laboratory-based procedure composed of 8 brief episodes (described in Table 1) that are increasingly stressful. During the procedure, the child, mother and an unfamiliar female research assistant interact in a room containing age-appropriate toys. The procedure involves two separations and reunions (3 minutes each) between the child and the mother, which can be curtailed if the child is highly distressed for more than 30 seconds. Children were primarily classified, according to their reactions upon reunion with their mother after each brief separation, into four attachment categories: secure (B), insecure-avoidant (A), insecure-ambivalent (C) and disorganized (D) (Ainsworth et al., 1978; Main & Solomon, 1990). Secure (B) children explore freely in the presence of their mother, and may show distress during her absence. Upon reunion, they happily great their mother and if they are distressed they seek her comfort and are easily soothed. Avoidant (A) children generally do not seek proximity to the mother and seem indifferent to her presence. They tend not to show distress

during separation and seem to not pay attention to their mother upon reunion. Ambivalent (C) children typically explore the least in the presence of their mother, are highly distressed during separation and are difficult to soothe upon reunion. They may simultaneously seek comfort and resist contact with their mother. Finally, disorganized (D) children seem to lack a strategy to use their mother as a haven of safety in times of stress and display incoherent, disorganized or disoriented behaviours during the reunions.

Insert Table 1

Videotaped reunions were coded by coders, trained by recognized experts, who were blind to participants' scores on all other measures. Coders achieved inter-rater reliability of 81% on this sample based on 18% of the videos resulting in 81% agreement (k = .71, p< .001) for all four attachment categories and an agreement of 88% (k = .75, p< .002) on secure versus insecure attachment scores. Of the 77 video tapes, 72 had available attachment classifications. Child attachment classification was distributed as follows: 44 secure (B; male, n=19), 12 avoidant (A; male, n=5), 1 ambivalent (C; male, n=1), and 15 disorganized (D; male n=8). For analysis, children were grouped into three categories: secure attachment (B= 61% of children), insecure attachment (A and C= 18%) and disorganized attachment (D= 21%). In order to increase statistical power (Stams, Juffer & van IJzendoorn, 2002), these categories were placed on a continuous scale based on their associated risks for behavioural problems (Carlson, 1998; Burgess et al., 2003; Fearon et al., 2010; Moss et al., 2006; Weinfield et al., 1999), where a secure attachment score (B) was 1, insecure attachment (A and C) was 2 and disorganized attachment (D) was 3. A linear relationship can be observed between the continuous attachment score and the attachment subtypes, confirming that using a continuous score is warranted in this case (Table 2).

Insert Table 2

Behavioural Inhibition Measure (BIM): Behavioural inhibition was measured using video footage of the Strange Situation procedure at T2 using operationally defined behaviours based on work by Kagan and colleagues (Garcia-Coll et al., 1984; Schwartz et al., 1999). Since inhibited behaviour is identified in terms of reactions to novel and unfamiliar situations or individuals, it thus can be assessed during the entire SSP. Although the best suited SSP episodes would seem to be the ones involving the presence of the Stranger (i.e.: episode 3, 4 and 7), to test this assumption, the entire SSP was coded initially. Behaviours such as spontaneous vocalizations, displays of negative affect, play and proximity to the mother and stranger were coded from videotaped sessions of the SSP. For a detailed description of the coded behaviours see Appendix A. To maximize the objectivity of the measured behaviours and ensure the measure's sensitivity to the full range of inhibited to uninhibited behaviours, frequency or length of operationally defined behaviours was coded for each SSP episode. For example, frequency of vocalizations throughout an episode was coded in order to record the broad range and variability in vocalizations among the children and to define children who vocalize a lot versus those who vocalize less or not at all. Some behaviours were coded as either present or not, but most were coded in terms of frequency or as a duration in seconds divided by the length of the episode (in seconds) within which the behaviour was observed (duration of behaviour/duration of episode).

Preliminary factor analysis revealed that SSP episodes 2, 3 and 7 had factors that could be identified as descriptive of inhibited-uninhibited behaviour (for detailed description, see Appendix B). The variables retained for coding for each episode following factor analysis are shown in Table 3. Since each episode differed on its components (presence of mother, presence of both mother and stranger or only presence of stranger) and since none of the three factor scores correlated with each other (all *ps*>.05), they potentially measure different aspects of behavioural inhibition and were therefore analysed separately to evaluate which best measured inhibited and uninhibited behaviour. In order to create a more generalizable inhibition score, composite scores were computed from summed standardized scores of variables with loadings .30 and over for each episode. Composite scores correlated strongly with their respective factor scores (E2, r= .97; E3, r= .83; E7, r= .89, all *ps*<.001). Finally, as a further check of robustness, composite scores based on theoretical representation of a

behavioural inhibited profile in the literature (Garcia-Coll et al., 1984; Reznick et al., 1989) were also computed. These theory scores were computed from summed standardized scores of the variables coded for each episode to represent inhibited-uninhibited scores where higher scores signified higher behavioural inhibition. The E2 theory score was composed of reversed spontaneous vocalizations, reversed vocalizations to the mother, negative affect, proximity to mother 0 to 1m, reversed proximity to mother 1 to 2 m, reversed proximity to mother 2m and over and reversed play. The E3 theory score was composed of reversed spontaneous vocalizations, reversed vocalizations to the mother and to the stranger, negative affect, interruption of behaviour due to stranger, goes to mother due to stranger, proximity to mother 0 to 1 m, reversed proximity to mother 1 to 2 m, reversed proximity to mother 2 m and over and reversed play and reversed play with stranger. Finally, the E7 theory score was composed of reversed spontaneous vocalizations, reversed vocalizations to the stranger, negative affect, calling for the mother, interruption of behaviour due to stranger, goes to the door due to stranger, reversed proximity to stranger 0 to 1 m, proximity to stranger 1 to 2 m, proximity to stranger 2 m and over and reversed play and reversed play with stranger. Theoretical composite scores were also highly correlated with their respective factor scores and composite inhibition scores (E2, r= .80; E3, r= .55; E7, r= .75, all *p*s<.001).

Insert Table 3

In summary, three episodes of the strange situation had components consistent with capturing variation in inhibited-uninhibited behaviours (episodes 2, 3 and 7), and three scores were calculated per episode, a factor score, a composite score, and a theory based composite score. High scores on factor, composite and theoretical BIM scores indicate high levels of behavioural inhibition. A coder trained by the main author and blind to inhibition and attachment classification coded 10 randomly selected videotapes. Intra-class correlations between the raters variable scores ranged from .90 to 1.00 (*ps*<.001) for Episode 2, from .80 to 1.00 (*ps*<.01) for Episode 3 and 64 to 1.00 for Episode 7 (*ps*< .05). Although one variable had a low ICC (.64), the next lowest coefficient for Episode 7 was .95. Although analysis of

validity was done with all three types of scores (i.e.: factor, composite and theory), results for the theory scores will be presented for conciseness. For a complete comparison of all three types of score for each of the three episodes, please refer to Appendix B.

Temperament: Child temperament was assessed using three questionnaires:

Non-caregiver Observational Temperament AQS-based scale (N-COTA; revised from Zdebik, 2006), was administered at T2. The 12-item N-COTA (Table 4) was based on the filler temperament items of the Attachment Q-set (AQS Version 3; Waters, 1987). The N-COTA permits to measure a child's behavioural inhibition observationally. It was completed by two research assistants after having observed the child's behaviour throughout the first T2 home visit. The research assistants rated how well each item described the child's behaviour on a 9-point scale (1=does not describe the child at all: not typical, 9=describes the child very well: typical), where higher scores on the scale reflected more sociable behaviours and low scores reflected increased shyness and behavioural inhibition. Assistants' scores were averaged. Final scores were reversed so that high scores represented increased shyness in order to facilitate later result interpretation. Oosterman and Schuengel (2007) also used the AQS filler items as a measure of behavioural inhibition; however, their measure was compiled with 3 items from the mother's reported AQS.

Initially all AQS items relating to shyness and sociability were included in the measure for a total of 14 items. One item was removed because the behaviour was observable in less than 50% of children during the home visit. Internal consistency was tested for the remaining 13 items. One variable's corrected item-total correlation was .09 and was therefore removed from the measure. All other variables had corrected item-total correlations above .40. Inter-rater reliability information was unavailable. The N-COTA's had excellent internal consistency (α = .95) for the current sample. The lowest corrected item-total correlation across items was .44 (range = .44 to .89; median= .81), and inter-item correlations ranged from .26 to .89 (median = .63) supporting the proposition that scale items appeared not to be redundant (Ferketich, 1991; Lance, Butts & Michels, 2006). Furthermore, analysis of variance (ANOVA) showed that the children's scores on the N-COTA were not related to attachment classification, $F(2, 45) = 0.38$, $p = .67$. To test the N-COTA's convergent validity,

correlation coefficients were computed with the measure and the maternal report temperament questionnaires collected at T1 and T2: the Fear and Approach scale of the IBQ-R and the Shyness and Sociability scales of the ECBQ, described earlier. Significant correlations were found between children's N-COTA scores in three out of the four maternal reported temperament scales (Fear, r= .24, p= .110; Approach r= -.33, p= .028; Shyness r= .54, p<.001; Sociability r= -.52, p<.001). The research assistants that rated the children on the Non-caregiver observational temperament scale were not involved in the administration or coding of the Strange Situation or the BIM.

Insert Table 4

Infant Behaviour Questionnaire-R (IBQ-R: Gartstein & Rothbart, 2003), administered at T1. This maternal report questionnaire of 191 items and assesses infant temperament on the following 14 scales: Activity Level, Distress to Limitations, Fear, Duration of Orienting, Smiling and Laughter, High Pleasure, Low Pleasure, Soothability, Falling Reactivity/Rate of Recovery from Distress, Cuddliness, Perceptual Sensitivity, Sadness, Approach, Vocal Reactivity. Mother was asked to rate the frequency of her child's temperament behaviours over the last 2 weeks on a 7-point scale (1= never to 7= always). The Fear and Approach scales were used in our analyses to test convergent validity of the BIM. The Fear scale measures "startle or distress to sudden changes in stimulation, novel physical objects or social stimuli" and "inhibited approach to novelty" and the Approach scale measures "Rapid approach, excitement, and positive anticipation of pleasurable activities" (Gartstein & Rothbart, 2003). Both scales had good reported internal consistency (Fear, α =.90; Approach, α =.87, Gartstein & Rothbart 2003). Internal consistency for the current sample was comparable (Fear scale, α =.93; Approach scale, α =.86). All other scales were used to assess our measure's divergent validity.

Early Childhood Behaviour Questionnaire (ECBQ: Putnam, Gartstein & Rothbart, 2006), administered at T2. The ECBQ is designed to assess temperament in 18 to 30 month-old children. This 201-item questionnaire is composed of 18 scales: Activity Level/Energy,

Attentional Focusing, Attentional Shifting, Cuddliness, Discomfort, Fear, Frustration, High-intensity Pleasure, Impulsivity, Inhibitory Control, Low-intensity Pleasure, Motor Activation, Perceptual Sensitivity, Positive Anticipation, Sadness, Shyness, Sociability and Soothability. Mother reported frequency of her child's temperament behaviours on a 7-point scale (1= never to 7= always) during the last 2 weeks. We used the Shyness and Sociability scales to assess BIM convergent validity in our analyses. The Shyness scale assesses "slow or inhibited approach and/or discomfort in social situations involving novelty or uncertainty" and the Approach scale measures "seeking and taking pleasure in interactions with others" (Putnam et al., 2006). Internal consistency for the current sample (Shyness scale, α =.84; Sociability scale, α =.86) was good and was comparable to reported internal consistencies (α =.88 and .78, respectively: Putnam et al., 2006). All other scales were used to assess BIM divergent validity.

Results

Prior to analysis, normality of data distribution was verified and data was screened for outliers (Tabachnick & Fidell, 2007). No outliers were found in the sample. Appendix B provides detailed results for all three BIM scores (factor, composite and theory).

Divergent validity of the BIM score with attachment classification

As expected, none of the BIM theory based scores were significantly related to attachment scores: E2 (ANOVA, $F(2, 67) = 0.77$, $p = .47$), E3 ($F(2, 69) = 0.14$, $p = .87$) and E7 ($F(2, 63) = 0.82$, $p = .44$). Similar results were found when BIM scores were correlated with attachment as a continuous score (all *ps*> .05). Similar results were found with the factor and composite BIM scores.

Convergent and divergent validity of the BIM with temperament questionnaires: Infant Behaviour Questionnaire-Revised (IBQ-R), Early Childhood Behaviour Questionnaire (ECBQ) and the Non-caregiver Observational Temperament AQS-based scale (N-COTA).

Convergent validity of the BIM scores were examined in relation to the Fear and Approach scales of the IBQ-R questionnaire, which are expected to be related to behavioural

inhibition. Pearson correlations revealed significant positive associations between maternal reports of Fear scores and the E2 BIM score (r = .31, p= .034). As children's IBQ Fear scores increased, their E2 BIM score also increased. Furthermore, the E2 BIM score negatively correlated with the IBQ-R Approach scale (r = -.37, p= .011). Therefore, children who scored higher on the IBQ-R Approach scale had lower E2 BIM scores. There were no significant relationships between Fear or Approach scores and the child's E3 and E7 BIM scores (all *ps* > .05; see Table B1, Appendix B). Similar results were found with the factor and composite scores (Table B1).

The Shyness and Sociability scales of the ECBQ were also used to examine BIM convergent validity. Pearson correlation approached statistical significance for the E2 theory score and the Shyness scale (r = .22, p= .081) (E2 factor and composite scores significantly correlated with the Shyness scale; Table B1). E2 theory score negatively correlated with the ECBQ Sociability scale (r= -.26, p= .033). Therefore, as children's Approach scores increased, children's E2 BIM scores decreased. The E3 theory score was only significantly associated with the Shyness scale (r = .26, p= .033), however, similar results were not found for the E3 factor and composite scores (Appendix B). The E7 theory score was not significantly correlated with either the Shyness or the Sociability scales of the ECBQ (all *ps*> .05; Table B1).

Convergent validity was also examined with a non-caregiver reported questionnaire, the N-COTA. Pearson correlations revealed that the E2 theory score was significantly and positively correlated with the N-COTA (r= .43, p= .003). The E3 theory score was significantly positively associated with the N-COTA (r = .30, p= .036), although this was not the case for the equivalent composite and factor E3 scores (Appendix A). The E7 score was not significantly correlated with the N-COTA (p > .05, Table B1).

Divergent validity of the BIM was assessed by comparing the score to all other IBQ-R scales (i.e.: those scales that were not predicted to be related to behavioural inhibition). For the E2, E3 and E7 theory scores, no significant relationships were found with any of the remaining IBQ-R scores (all *ps* > .05). In contrast, E3 and E7 factor scores correlated with

several of the remaining IBQ-R scales, whereas the E2 did not, thus presenting stronger evidence for divergent validity for E2 compared to E3 and E7 (Table B1).

Furthermore, when examining the remaining ECBQ scales, the E2 theory score was also associated with the Motor scale (r = -.34, p= .005) and the Perceptual scale (r = -.26, p=.039). The E3 theory score was negatively correlated with the Activity scale of the ECBQ (r = -.26, p= .031) and was positively correlated with the Attention scale (r = .31, p= .012). However, some differences were found when considering the factor and composite scores of both E2 and E3 (Appendix B). There were no significant associations found with any ECBQ scales and the E7 score (Table B1).

In sum, the E2 behavioural inhibition measure, based on Episode 2 of the strange situation procedure, correlated most strongly with those temperament scales theoretically linked to behavioural inhibition for all three temperament questionnaires (i.e.: IBQ-R, ECBQ and N-COTA). Similar results were found with the factor and composite scores (see Table A.1, Appendix A). For these reasons the E2 theoretical behavioural inhibition measure was considered to be a better measure of behavioural inhibition than the E3 and E7 scores. Therefore, the E2 theory BIM score was used in all subsequent analyses and will henceforth be referred to as the BIM score.

Part 2: Convergent validity of the BIM assessed by comparison to a gold-standard observational behavioural inhibition measure.

Methods

Participants

An existing videotaped measure of behavioural inhibition from a leading child development laboratory (CDL) studying BI was used to assess the BIM's (described in the section above, Part 1) convergent validity. Thirty-one mother-child dyads from the CDL were randomly selected from a larger longitudinal study examining the role of temperament in the socio-emotional development of children from 4 months to 10 years-old (see White et al.,

2011). Children in the current sample were randomly chosen from a sample of children selected for emotional and motor reactivity to stimuli at 4 months of age (Hane, Fox, Henderson & Marshall, 2008; White et al., 2011). The original sample and recruitment procedures are described in Hane et al. (2008). In the current sample, the children (female n=14) were approximately two years old (mean age= 26.32 months, *SD*= 0.51). Mothers had a mean age of 34.86 years (*SD* = .96) and were well-educated: all had at least completed a high school education, 58% had graduated from college and 36% had a graduate school degree. The dyads were from middle class families from a large urban area of eastern USA. Of the families, 61% were Caucasian, 16% were African American, 17% were of mixed ethnicity, 3% were Asian, and 3% were Hispanic.

Instruments

The Child Development Laboratory Behavioural Inhibition measure (CDL-BI): The Child Development Laboratory behavioural inhibition measure (CDL-BI), a well-established laboratory BI paradigm based on the Kagan protocol (1984) (Fox et al., 2001, Perez-Edgar, Reeb-Sutherland, McDermott, White, Henderson, Degnan, et al., 2011; White et al., 2011) assesses behavioural inhibition based on child behaviours during 4 episodes: 1) mother and child enter an unfamiliar room with a chair for the mother and age-appropriate toys for the toddler. The mother is asked to fill out a questionnaire while the child is free to explore the room. After 5 minutes, a research assistant enters and asks the dyad to put away the toys before she comes back to collect them. 2) An unfamiliar female experimenter enters the room with a toy truck and blocks and sits in silence for 1 minute, then plays with the truck for 1 minute and, if the child has not initiated play, she invites the child to play with her, for about a minute before leaving with the toys. 3) The unfamiliar experimenter returns with a noisy toy robot that has flashing lights, speaks loudly and walks around (duration 2 minutes). 4) The experimenter returns with an inflatable tunnel and invites the child to crawl through the tunnel. Throughout the procedure the mother is asked to refrain from interacting with her child or to interact minimally if her child solicits her attention.

CDL-BI scores were based on the child's reactions coded during the free play episode, the stranger with a truck episode, the robot episode and the tunnel episode. A

composite score was created for each episode by summing the standardized scores of the following coded behaviours: latency to vocalize, latency to approach or touch the stranger or the stimuli and the proportion of time spent in proximity to the mother. A Classic Behavioural Inhibition (CBI) score was computed using the stranger, robot and tunnel episode averaged standardized scores and a Total Behavioural Inhibition (TBI) score was computed using the freeplay, stranger, robot, and tunnel averaged standardized scores. The Classic and Total Behavioural Inhibition scores were used to test the BIM score's convergent validity. Coding and reliability information is detailed in White and colleagues (2011).

Behavioural Inhibition Measure (BIM): Behavioural inhibition was measured using the BIM (see instruments Part 1). A priori power analysis determined that a sample of 28 CDL-BI videos (described above) was required to adequately test convergent validity using the BIM, assuming an effect size of .50, desired power of .80 and alpha of .05 (Cohen, 1988; Faul, Erdfelder, Buchner & Lang, 2009; Faul, Erdfelder, Lang & Buchner, 2007). Thirty-one randomly selected CDL-BI videos were available for coding; hence all available videos were coded using the newly validated BIM score described above. Only the free play session (i.e.: the initial 5 minutes corresponding to Episode 1) of the CDL-BI, when the child is able to explore the novel room and toys while his mother is present, was coded since it most resembled the free play session (Episode 2) of the Strange Situation procedure on which the BIM score was based. The same coder that coded the BIM inhibition measure videos (see Part 1) coded all 31 videos. A second coder (different from the coders that coded the BIM videos) trained to be reliable on the BIM with a different set of videos, coded 6 randomly selected videos from the sample of 31 videos. Inter rater reliability, done on 19% of the sample, was assessed with intra-class correlations. Coefficients ranged from .83 to 1.00 (all *ps*< .05), with a median of .98. Both coders were blind to the CDL-BI scores. As in Part 1 above, summed standardize variable scores were used to create the BIM score.

Results

Convergent validity of the BIM with the Child Development Laboratory Behavioural Inhibition measure (CDL-BI):

Correlation coefficients between the BIM score and the two total existing CDL-BI scores coded from the same videotaped paradigm revealed that the BIM was strongly positively correlated with the CDL-BI Classic score (r= .52; p= .003) and the CDL-BI Total score (r= .55; p= .001).

Part 3: Examining the independent and interactive contribution of behavioural inhibition and attachment to the development of internalizing and externalizing problems

Methods

General procedures and participants were identical to Part 1.

Instruments

Attachment: Attachment was measured using the Strange Situation procedure (see instruments Part 1).

Behavioural Inhibition Measure (BIM): Behavioural inhibition was measured using the BIM (see instruments Part 1).

Social Emotional Development: Behavioural problems were measured using a preliminary version of the Infant-Toddler Social and Emotional Assessment (ITSEA; Briggs-Gowan & Carter, 1998; Carter, Briggs-Gowan, Jones & Little, 2003). This caregiver report questionnaire aimed at children between 12 and 24 months of age, consisted of 105 items grouped into four behavioural domains (Externalizing, Internalizing, Maladaptive and Dysregulation) and one Competence domain. The early version of the Internalizing domain was composed of two subscales: inhibition/separation problems and depression/social withdrawal, whereas the Externalizing domain contained four subscales: activity, aggression, peer aggression and emotional negativity. Mothers were asked to rate their children on a 3 point scale (0= not true/rarely, 2= very true/always). Since the early version of the measure differed on some items with current ITSEA versions, all available items pertaining to the Internalizing domain and all items associated with the Externalizing domain were summed to

create an Internalizing and Externalizing score to use in the analysis (personal communication M. Briggs-Gowan, December 11th, 2009). The internalizing score was composed of items such as "Is very clingy" and "Is shy with new children" and the externalizing score contained items such as "Has temper tantrums" and "Is disobedient or defiant". The current sample had good internal consistency for both the Internalizing score (α = .80) and the Externalizing score (α = .82).

Results

Predictive validity: Behavioural inhibition measure (BIM) and attachment scores as predictors of internalizing and externalizing behavioural problems:

Prior to analysis, correlations and t-tests were performed with participant age, gender, birth size, maternal age, family socio-economic status (based on maternal education and family income) in order to identify potential socio-demographic covariates related to the dependent variables, i.e. the internalizing and externalizing behavioural problems scores. No significant associations were found with socio-economic variables and BI (all *ps*> .05), therefore they were not controlled for in further analyses.

Hierarchical regressions were performed to examine the independent and interactive contributions of behavioural inhibition and attachment to the development of internalizing and externalizing behavioural problems (Table 5). Since no socio-demographic variables were associated with internalizing problems, none were entered in the hierarchical regression model. Since the BIM and attachment were coded from the same paradigm, we entered the attachment score in the first step in order to control for any possible effect it may have on the BIM score. The regression analyses were therefore performed with attachment in Step 1, behavioural inhibition in Step 2 and attachment x behavioural inhibition interaction term in Step 3.

Results predicting internalizing behavioural problems were as follows: attachment had no significant effect (β = .14), whereas, behavioural inhibition (β = .31) significantly predicted internalizing problems (explaining 8.5% of the variance). When the attachment x

behavioural inhibition interaction term (β = .001) was added to the model, it failed to reach statistical significance. A model containing only behavioural inhibition as a predictor of internalizing problems explained 9.0% of the total variance.

Regarding externalizing problems, attachment (β = .29) significantly predicted externalizing behavioural problems (explaining 6.7% of the variance). Behavioural inhibition had no significant effect (β = -.04). When the attachment x behavioural inhibition interaction term (β = .15) was added to the model, it failed to reach statistical significance.

Insert Table 5

Discussion

The main goal of the present study was to develop and validate a new observational behavioural inhibition measure based on video footage of the Strange Situation procedure that could easily and economically be added to existing studies. Several lines of evidence validated the measure. First, our behavioural inhibition measure (BIM) was independent of attachment classification, although it was based on the Strange Situation procedure. Second, principal component analysis revealed positive associations between the BIM and Fear and Shyness subscales and negative associations with the Approach and Sociability subscales of the IBQ-R and ECBQ, respectively. Furthermore, the BIM was positively associated with an observational non-caregiver report questionnaire that assessed shyness and sociability in a home setting. Third, BIM scores strongly correlated with the behavioural inhibition scores from an observational BI paradigm from another laboratory, further validating our new measure. Finally, behavioural inhibition assessed by our measure positively correlated with internalizing behaviours, but not with externalizing behaviours. In contrast, attachment scores were associated with externalizing behaviours but not internalizing ones. Therefore, our measure provided differential information to attachment about behavioural problems. No evidence was found for an interactive effect of behavioural inhibition and attachment on

behavioural problems. Taken together, these results provide evidence for validity of the new measure. The following sections discuss the results and their implications in greater depth.

Development and validation of the behavioural inhibition measure (BIM)

Developing a new measure of behavioural inhibition based on video footage of the Strange Situation procedure revealed that, of the eight SSP episodes, child behaviour in Episode 2 (when the child is initially in free play in the room with only his mother and some toys) was most valuable for categorizing child inhibition profiles. This finding somewhat contrasts with current observational paradigms measuring behavioural inhibition as they use more elaborate, lengthier methods involving, for example, masked experimenters, talking robots or peer groups in order to assess behavioural inhibition in young children (Burgess et al., 2003; Calkins & Fox, 1992; Calkins et al., 1996; Garcia-Coll et al., 1984; Fox et al., 2001; Kagan, 1989; Pfeifer et al., 2002; Reznick et al., 1989; Schwartz et al., 1999; Shamir-Essakow et al., 2005). It is possible that the only novelty needed to elicit differences in child behavioural inhibition is an unfamiliar room and toys, i.e. a novel environment to explore. If this is indeed the case, a simple three minute assessment of four behaviours (see Table 3) would be sufficient to identify behavioural inhibition in children. Therefore, the BIM can not only be added retrospectively to studies that have videotaped Strange Situation procedures, it can also be added to any study that has video footage of a free play situation involving a parent and toddler dyad. Considering increased longitudinal multidisciplinary collaboration investigating several dependant variables at once, the ability to easily incorporate a standardized observational temperament measure without overburdening participants would carry great advantages over questionnaires.

Having confirmed with principal component analysis that a behavioural inhibition-uninhibition factor could be extracted from behaviours present in Episode 2, the BIM score was not only based on theoretical definition of BI behaviours but also highly correlated with the extracted factor score and even a more generalizable composite score. The computational simplicity and its increased generalizability was an additional advantage of the BIM theory score.

Consistent with our first hypothesis, although coded from the same paradigm, our behavioural inhibition measure was not related to attachment classification. Our results are consistent with previous research stating that attachment is independent from temperament (Carlson, 1998; reviewed in Vaughn et al., 2008). Since no consistent factor of BI was found for Episode 5 and 8 of the Strange Situation procedure this points to additional evidence for divergent validity. These episodes involve reunions of the child and mother after separation and are most salient in the classification of attachment. Perhaps the children's behaviours in these episodes are more related to attachment and are thus not ideal to measure behavioural inhibition. Furthermore, the fact that Episode 5 and 8 are not related to the inhibition measure reduces the possibility that shared variance between the BIM and the Strange Situation may have affected the results of the study.

Also consistent with previous research, the BIM score was moderately related to mother reported temperament (Bishop, et al., 2003; Calkins et al., 1996; Garcia-Coll et al., 1984; Fox et al., 2001; Reznick et al., 1989). It was positively related to the fear scale and negatively related to the approach scale of the IBQ-R, which was collected a year prior to the BIM. It also positively correlated with the shyness and negatively correlated with the sociability scales of the ECBQ, although it only approached significance with the shyness scale. Similar associations between temperament questionnaires and behavioural inhibition measures have been documented. Kagan and colleagues (1984) showed that inhibited children were rated less likely to approach and more likely to withdraw from unfamiliar situations (Garcia-Coll et al., 1984). Furthermore, several researchers demonstrated that higher scores on the Fear and Shyness scales reflected more pronounced inhibited behaviour in children (Calkins & Fox, 1992; Calkins et al., 1996; Fox et al., 2001; Pfeifer et al., 2002). Such results confirm the validity of the BIM. Furthermore, the BIM was positively correlated with the N-COTA, which represented shyness and decreased sociability in a home setting as measured by non-caregivers. Hence, we were able to confirm convergent validity with maternal reports of child temperament and also with observational reports of non-caregivers. Divergent validity was also confirmed since our measure did not significantly correlate with most of the other scales of the maternal report temperament measures. Although not significantly so, other temperament scales such as the Smiling and Laughter of the IBQ-R

and the Activity Level scales of the IBQ-R and ECBQ were negatively correlated with the BIM score as anticipated, since previous research reported that children with higher scores on theses scales were less likely to be inhibited (Calkins & Fox, 1992). Taken together, these results confirm evidence for good construct validity of our new behavioural inhibition measure.

Although we were able to identify factors that seemed to depict inhibited-uninhibited profiles in other episodes of the SSP, namely episode 3 and 7, these were generally not significantly related to anticipated temperament scales or observational measures of shyness and sociability (N-COTA). In contrast to the BIM score based on Episode 2, some behaviours that were coded in episodes 3 and 7 were related to the stranger (for example, approaching the stranger, spontaneous vocalizing to the stranger or playing with the stranger). For example in Episode 3, children that displayed such behaviours had to go out of their way to interact with the stranger who initially quietly read a magazine without looking at the mother or child. The age of the children in our sample may account for the lack of association of episodes 3 and 7 with maternal reports of inhibited behaviours, as younger children may in general be more apprehensive in approaching or interacting with adult strangers.

Furthermore, negative affect was more pronounced, particularly in Episode 7 compared to Episode 2. Episode 7 corresponds to the second separation from the mother and subsequent return of the stranger instead of the mother, which was quite distressing for most children at 18 months. Negative affect was not as frequent in Episode 2. Other researchers also found that negative affect was infrequent in the initial free play episodes of their BI paradigms (Garcia-Coll et al., 1984). Reznick and colleagues (1989) also measured BI in an unselected sample of children and showed that, although negative affect contributed to overall BI scores, it minimally contributed to predicting later BI. Having removed negative affect from their overall BI score, their score was still significantly associated to maternal reports of fear, shyness, approach and sociability temperament scales (Reznick et al., 1989). It is possible that as Episode 7 was distressing to the majority of children and increased negative affect could have compromised the predictability of that BI score. Since most children are crying at this stage, it is possible that coding behaviours in this episode may

simply record intensity of distress. Furthermore, Episode 7 had to be shortened for some children as they were too distressed to stay the full typical 3-minute duration, which could have also affected the validity of that score. In summary, it is possible that compared with Episode 2, Episodes 3 and 7 were overall too stress-inducing to measure variations in behavioural inhibition behaviours in very young children. Therefore, as previously argued, an uncertain and unfamiliar situation may be all that is required to identify behavioural inhibition (Kagan & Snidman, 2004; Kagan et al., 1999; Reznick et al., 1989).

Even though Episode 2 of the Strange Situation procedure seems to be a good measure of behavioural inhibition, caution should always be used when new measures tend to radically simplify well-established and well-documented measures. To further assess the validity of the new measure, it was important to evaluate our results by coding the initial few minutes of video footage from a well-established behavioural inhibition procedure (CDL-BI) (Degnan, Hane, Henderson, Moas, Reeb-Sutherland & Fox, 2011; Perez-Edgar et al., 2011; White et al., 2011). Videotape footage of mother-child dyads in similar situations to Episode 2 of the SSP (i.e.: free play session with mother present, before research assistants enter the room to engage the child) were coded using the BIM. Consistent with our second hypothesis, the BIM scores positively correlated with CDL-BI scores which further validated the BIM as a measure of behavioural inhibition providing evidence that the BIM may be an economical method of identifying inhibited and non-inhibited children. Therefore, as mentioned earlier, perhaps the only necessary components to identify behavioural inhibition in toddlerhood is an unfamiliar environment with novel toys to explore. An increased sensitivity to novel or uncertain situations has also been documented in BI children (Kagan & Snidman, 2004). Definitions of BI have emphasized the initial tendency to react to unfamiliar events or novelty (Garcia-Coll et al., 1984; Degnan & Fox, 2007). Reznick and colleagues (1989, p.30) defined BI as a '...vulnerability to the uncertainty caused by unfamiliar events that cannot be assimilated easily'. Therefore, it is possible that what are captured by the BIM are the initial reactions to unfamiliarity and the heightened physiological reactions to a novel environment and that this is best captured in the early E2 episode of the Strange Situation.

Furthermore, Marshall and Fox (2005) investigated the relation between early temperament reactivity at 4 months and later attachment classification in the Strange Situation procedure. They concluded that early reactivity to novel objects or situations was not related with primary attachment classification or to security or insecurity, but with increased distress in the SSP. They reported that 'measurements of emotional responses to discrete stimulus presentation (e.g., novel objects) or situations (e.g., arm restraint) outside of the context of mother-child interaction are likely to reflect biologically based aspects of temperament to a greater extent than measures of emotional expression during interactions with the parent, which may more reflect aspects of that dyadic relationship' (Marshall & Fox, 2005, p.499). Therefore, the behaviours measured with the BIM in the E2 episode of the SSP may represent reactions to the novel objects and situations and not behaviours related to dyadic interactions (i.e.: attachment).

Behavioural inhibition measure (BIM), attachment and internalizing and externalizing behavioural problems

Consistent with our third hypothesis, the BIM measure differentially predicted child behaviour problems compared to the well-established Strange Situation procedure, thus reducing the possibility that shared method variance affected our results. Specifically, high scores on the BIM concurrently predicted child internalizing behavioural problems; however, the BIM was not related to externalizing problems. On the other hand, attachment predicted externalizing but not internalizing problems.

First, these results are consistent with previous studies showing that inhibited children, specifically extreme cases of inhibition, are at increased risk for internalizing problems such as social withdrawal, anxiety and depression (Albano, Chorpita & Barlow, 2003; Biederman et al., 1990, 1995; Rosenbaum, Biederman, Hirshfeld, Bolduc, Faraone, Kagan & Snidman, 1991). However, low scores on the BIM were not consistent with research showing that uninhibited children are at increased risk for externalizing behaviours compared to inhibited children (Biederman et al., 1990; Burgess et al., 2003; Schwartz et al., 1996). Since the goal of our study was to create a continuous inhibition scale, we did not compare extreme cases of BI in our sample. Reznick and colleagues (1989), having also

measured behavioural inhibition continuously in a normative sample, arbitrarily separated children into extremely inhibited and extremely non inhibited by selecting the top and bottom 15% of their sample and classifying the rest as average BI. Although they did not examine behavioural problems, they found that children in the extreme groups showed stronger effects with questionnaire temperament profiles compared to results with the whole sample. Furthermore, they also found that their continuous BI score was skewed towards inhibition and not towards lack of inhibition, stating that perhaps not enough behaviours representing uninhibition were measured initially. Similarly, although we tried to ensure the BIM measured both extremes of behavioural inhibition, the inability to accurately observe uninhibited behaviours such as smiling may have contributed to the BIM's ability to better predict internalizing problems compared to externalizing ones.

A main component of our BIM score was close proximity (within 1 meter) to the mother. Pierrehumbert and colleagues (2000) used the Strange Situation to categorize children as being proximal (clingy and close to the mother) or distal (frequently exploring away from the mother) as a measure of temperament. Similar to our results, proximal children adapted less well and were less open to novelty compared to distal children, and proximal behaviour (versus distal) was predictive of parent reported internalizing but not externalizing problems (Pierrehumbert, Miljkovitch, Plancherel, Halfon, & Ansermet, 2000).

Although behavioural inhibition was not related to externalizing behavioural problems, attachment was. Our results are consistent with studies demonstrating that compared to infants with a secure attachment, insecure children are at increased risk for behavioural problems (Burgess et al., 2003; Weinfield et al., 1999) but that it is disorganized attachment that are most at risk for later behavioural problems (Carlson, 1998; Moss et al., 2006) particularly externalizing problems (Lyons-Ruth et al., 1997; Fearon et al., 2010). Our attachment measure was a continuous measure with a low score related to a secure attachment, a medium score related to insecure attachment and high scores were related to a disorganized attachment. It is possible that this linear relationship, where disorganized attachment is at one extreme and secure attachment is at the other, is causing the positive association with externalizing behaviours in our sample. A recent meta-analysis concluded

that insecure and disorganized attachment was more strongly related to externalizing than internalizing behavioural problems (Groh et al., 2012). Our results were also similar to those of Bureau & Moss (2010). Children classified as disorganized were rated by their teachers as having significantly higher levels of externalizing behavioural problems at preschool age (6 years-old) and at school age (8 years-old) compared to their secure and avoidant peers (Bureau & Moss, 2010). However, they were only marginally more likely to have higher reported internalizing problems. Since in our sample we only have one child classified as ambivalent, avoidant and ambivalent were categorized together as insecure. The use of a continuous scale (secure as 1, avoidant and ambivalent as 2 and disorganized as 3) could reflect the results seen in Bureau & Moss (2010), where disorganized children were more likely to display externalizing problems compared to secure and avoidant children. It is striking that we observed similar results based on maternally-reported behavioural problems as did Bureau & Moss (2010) based on teacher reported questionnaires.

Interactions between behavioural inhibition and attachment

Behavioural inhibition and attachment did not have interacting effects on internalizing or externalizing behavioural problems. These results are consistent with studies describing independent effects for both behavioural inhibition and insecure attachment on increased risk for concurrent internalizing problems (teenage sample: Muris & Meester, 2002; early childhood sample: Shamir-Essakow et al., 2005). However, they differ from studies describing longitudinal interaction effects between behavioural inhibition and attachment on increased risk for later outcomes. For example, Muris and colleagues (2011) found that attachment and behavioural inhibition have interacting effects on worry or anxiety disorders in 5 to 8 year-olds followed for 3 years. Burgess and colleagues (2003) found an interaction between infant insecure-avoidant attachment and behavioural inhibition in toddlerhood, where uninhibited children with an avoidant attachment presented highest levels of externalizing behaviours, particularly aggression, at age 4. Bohlin and colleagues (2005) found that infant insecure attachment and high behavioural inhibition at 4 years-old predicted lower social competence at 8 years of age, whereas secure infant attachment in children with high BI was predictive of higher social competence. They also found that behavioural inhibition measured in infancy only predicted later BI and not social competence. It is

possible that these results concerning older children reflect more stable BI, yielding stronger results. Also, results from both Bohlin et al. (2005) and Burgess et al. (2003) may reflect problematic behavioural outcomes being more easily detected at older ages and not in infancy, and that measuring risk factors longitudinally may reflect more stable effects on later behavioural problems particularly in reference to BI (Vasey & Dadds, 2001). Furthermore, a possible explanation for the interaction result inconsistencies found in the different studies may be due to the different methodologies used or different populations (clinical vs. non clinical) studied or outcomes measures. For example, some studies examined attachment by looking at three (A, B and C) categories, while others included four (A, B, C and D) which may yield different results (Burgess et al., 2003; Shamir-Essakow et al., 2005, Warren et al., 1997). More research must be conducted on these variables in relation to early development of internalizing and externalizing disorders both in at risk samples and in the general population.

Limitations

Although showing promising results, the current study had several limitations that must be addressed. First, the small sample may have compromised the validity of the factor analysis. The purpose of our study was to create a generalizable measure of behavioural inhibition, and we used principal component analysis as a guide to develop and identify possible inhibited-uninhibited factors, and hence corroborate our theory based score. Using principal component analysis, although on a small sample, gives us confidence that our BIM score is relevant.

The current study did not control for maternal risk factors that could have been associated with children's socio-emotional development. Maternal characteristics, for example maternal personality and parenting style, have been shown to moderate the relationship between child temperament and later social adjustment (Coplan, Arbeau & Armer, 2008). Prenatal and postnatal maternal stress, anxiety and depression, have been associated with later problematic outcomes (Ashman, Dawson, Panagiotides, Yamada & Wilkinson, 2002; Dawson, Ashman, Hessl, Spieker, Frey, Panagiotides et al., 2001; Dawson, Ashman, Panagiotides, Hessl, Self, Yamada et al., 2003; Glover & O'Connor, 2002; Meaney,

2007). Furthermore, the well-being of both parents can affect a child's vulnerability to certain disorders (Bögels, Stevens & Majdandžić, 2011; Verhoeven, Bögels & Van der Bruggen, 2012). Therefore, future studies should examine if parental stress and psychopathology interact with behavioural inhibition in predicting risk for child psychopathology. Controlling for parental psychopathology is also important in regards to report bias. For example, studies have shown that maternal reports of child behavioural inhibition can be affected by maternal depression (Bates, Freeland & Lounsbury, 1979; Cicchetti & Toth, 1995), as well as by the quality of the attachment relationship (Shamir-Essakow et al., 2004). Such research underlines the importance of multiple sources of measurement and particularly of observational measures when studying behavioural inhibition. However, our outcome measure was maternal report only and may have been subject to bias. For example, objectivity of outcome measures has been shown to be related to larger found effect sizes when investigating links between attachment and externalizing problems (Fearon et al., 2010).

Finally, we only had one child that was classified as ambivalent. We opted to combine A and C children into an insecure group and create a continuous attachment score to increase statistical power. Although, we were unable to compare all four attachment classifications (i.e.: A, B, C and D), a recent meta-analysis showed that there was scant evidence that C children significantly differed from A children in relation to internalizing and externalizing behaviours and therefore, it may be acceptable to combine these into one groups when examining these specific outcomes (Groh et al., 2012).

Future Studies

Overall the results relating the BIM to internalizing problems are striking since our sample was not preselected for behavioural inhibition. It would be interesting to examine, perhaps in a larger sample, if the children who scored at the extremes of the BIM would be more at risk for later psychopathology, as previously reported (Degnan & Fox, 2007). Moreover, to further validate the BIM, examining potential physiological (for example, heart rate, cortisol or brain imaging) and genetic markers for behavioural inhibition would be important (Kagan et al., 2007). Furthermore, although the BIM concurrently predicted

internalizing problems, it would be important to see if predictions can also be made longitudinally. This would also permit to assess continuity and discontinuity of behavioural inhibition and potentially identify protective factors for later anxiety disorders (Degnan & Fox, 2007). Specifically examining the uninhibited stranger-oriented behaviours measured in the Strange Situation's Episode 3 and 7 to see if they can identify the most uninihibited children or even relate to other concepts such as socially indiscriminate attachment behaviours would be another potential avenue to explore. This would also enable to verify if these children would correspond to the widely reported 10 to 15% of the general population frequently classified as extremely uninhibited (Kagan, 1999; Kagan et al., 1989, 1993). Lastly, examining if the BIM could successfully be adapted to older children, for example, in the preschool Strange Situation procedure (Moss et al., 2004, 2006), would increase its possibility to be added to other existing longitudinal studies.

Conclusion

Large experimental longitudinal cohorts are now regularly being studied with multiple research foci. Thus the possibility to add measures of behavioural inhibition to ongoing research without either compromising the research or overburdening participants is very valuable. Furthermore, if videotapes are available, it can be assessed retrospectively, with clear advantages over retrospective questionnaires. Our results support previous results relating inhibited behaviour to internalizing problems, such as anxiety disorders (Biederman et al., 1990, 1995). Furthermore, attachment appears to predict externalizing problems but not internalizing problems, as has also been shown in previous studies most notably in relation to disorganized attachment (Lyons-Ruth et al., 1997). Our results indicate that attachment and our new inhibition measure, although measured from the same paradigm, can provide differential predictive information for childhood internalizing and externalizing problems.

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Table 1.

Strange Situation Procedure episodes: Taken from Ainsworth et al. 1978, p. 37, with names of episodes 3A, 3B, 3C added.

Ainsworth Strange Situation			
Episode	Persons present	Duration	Brief Description of Action
1	Mother, baby, & observer	30 sec.	Observer introduces mother and baby to experimental room, then leaves.
2	Mother & baby	3 min.	Mother is nonparticipant while baby explores; if necessary, play is stimulated after 2 min.
3	Stranger, mother, & baby	3 min.	Stranger enters. 3A: First minute: Stranger silent. 3B: Second minute: Stranger converses with mother. 3C: Third minute: Stranger approaches baby. After 3 minutes mother leaves unobtrusively.
4	Stranger & baby	3 min. or less[a]	First separation episode. Stranger's behaviour is geared to that of baby.
5	Mother & baby	3 min. or more[b]	First reunion episode. Mother greets and/or comforts baby, then tried to settle him again in play. Mother then leaves, saying "bye-bye".
6	Baby alone	3 min. or less[a]	Second separation episode.
7	Stranger & baby	3 min. or less[a]	Continuation of second separation. Stranger enters and gears her behaviour to that of baby.
8	Mother & baby	3 min.	Second reunion episode. Mother enters, greets baby, then picks him up. Meanwhile stranger leaves unobtrusively.

[a]Episode is curtailed if the baby is unduly distressed.

[b]Episode is prolonged if more time is required for the baby to become re-involved in play.

Table 2

Attachment correlations (N=72)

	Attachment			
	Attach	B	AC	D
Attachment continuous score [a] (Attach)	—			
Secure (B vs. others) [b]	-.92**	—		
Insecure (AC vs. others) [b]	.23*	-.59**	—	
Disorganized (D vs. others) [b]	.89**	-.64**	-.24*	—

[a]Attachment coded as a continuous variable, where secure attachment (B) = 1; avoidant and ambivalent attachment (AC) = 2, and disorganized attachment (D) = 3.

[b]Attachment coded in dummy variables contrasting each group with all other groups.

* $p < .05$; ** $p < .01$

Table 3.

Variables retained for analysis.

Behavioural Inhibition Measure	
Episode	Brief Description of Action
2	Spontaneous Vocalizations (Number/Length of Episode) Spontaneous Vocalizations to Mother (Number/Length of Episode) Negative Affect (Length of Beh.[a]/ Length of Episode) Proximity to Mother 0-1 m, 1-2 m, 2 m and over (Length of Beh./ Length of Episode) Play (Length of Beh./ Length of Episode)
3	Interruption of Behaviour (Length of Beh./ Length of Episode) Goes to Mother due to Stranger (Length of Beh./ Length of Episode) Negative Affect (Length of Beh./ Length of Episode) Spontaneous Vocalizations (Number/Length of Episode) Spontaneous Vocalizations to Mother (Number/Length of Episode) Spontaneous Vocalizations to Stranger (Number/Length of Episode) Proximity to Mother 0-1 m, 1-2 m, 2 m and over (Length of Beh./ Length of Episode) Play (Length of Beh./ Length of Episode) Play with Stranger (Length of Beh./ Length of Episode)
7	Interruption of Behaviour (Length of Beh./ Length of Episode) Goes to door due to Stranger (Length of Beh./ Length of Episode) Negative Affect (Length of Beh./ Length of Episode) Spontaneous Vocalizations (Number/Length of Episode) Spontaneous Vocalizations to Stranger (Number/Length of Episode) Calling to Mother (Number/Length of Episode) Play (Length of Beh./ Length of Episode) Play with Stranger (Length of Beh./ Length of Episode) Proximity to Stranger 0-1 m, 1-2 m, 2 m and over (Length of Beh./ Length of Episode) Proximity to Door 0-1 m, 1-2 m, 2 m and over (Length of Beh./ Length of Episode)

[a]Length of Beh. refers to Length of Behaviour.

Table 4.

Items from the Attachment Q-Sort questionnaire utilized for non-caregiver assessment of child behavioural inhibition: Non-caregiver observational temperament scale (N-COTA).

Non-caregiver observational temperament scale (N-COTA)		
Items	Description	Original AQS Items
1	Child is more interested in people than in things.	5
2	Child laughs and smiles easily with a lot of different people.	7
3	Child quickly gets used to people or things that initially made him shy or frightened him.	12
4	Child is willing to talk to new people, show them toys, or show them what he can do, if mother asks him to.	15
5	Child readily lets new adults hold or share things he has, if they ask to.	48
6	Runs to mother with a shy smile when new people visit the home. (R)	49
7	Child's initial reaction when people visit the home is to ignore or avoid them, even if he eventually warms up to them. (R)	50
8	Child enjoys climbing all over visitors when he plays with them.	51
9	Child is fearless.	57
10	Child largely ignores adults who visit the home. Finds his own activities more interesting. (R)	58
11	Child easily grows fond of adults who visit his home and are friendly to him.	66
12	When the family has visitors, child wants them to pay a lot of attention to him.	67

(R): Reversed scoring

Table 5

Hierarchical regression model with infant attachment and behavioural inhibition as predictors of internalizing and externalizing behavioural problems (N=68)

Predictor variables	ΔR^2	ΔF	(df)	ß
Internalizing behavioural problems (ITSEA)				
Step 1	.02	1.41	(1,66)	
Attachment[a] (SSP)				.14
Step 2	.09	6.72*	(1,65)	
Behavioural inhibition (BIM)				.31*
Step 3	.00	.00	(1,64)	
Attachment (SSP) x behavioural inhibition (BIM)				.001
Externalizing behavioural problems (ITSEA)				
Step 1	.08	5.85*	(1,66)	
Attachment[a] (SSP)				.26*
Step 2	.002	.12	(1,65)	
Behavioural inhibition (BIM)				-.04
Step 3	.02	1.44	(1,64)	
Attachment (SSP) x behavioural inhibition (BIM)				.15

[a]Attachment coded as a continuous variable.

* $p < .05$

CHAPTER III

STUDY 2

The Role of Preschool Attachment and Behavioural Inhibition in Predicting Intolerance of Uncertainty in Adulthood

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To be submitted to the *Journal of Anxiety Disorders*

This study was supported by grants and doctoral scholarships received from the Social Sciences and Humanities Research Council of Canada (SSHRC) and the Fonds Québécois de Recherche sur la Société et la Culture (FQSRC). We thank Jean Bégin for his valuable assistance.

Abstract

Anxiety disorders are both extremely prevalent and debilitating psychopathologies. Insecure childhood attachment is proposed as a risk factor for generalized anxiety disorder because it may promote the development of intolerance of uncertainty (IU). Similarly, child temperament, particularly behavioural inhibition (BI) has consistently been identified as a risk factor for anxiety disorders; however, it has not been examined in relation to IU. The present study tested the independent and interactive predictive effects of attachment and behavioural inhibition in preschoolers on the development of intolerance of uncertainty 15 years later. Sixty children were observed in a separation-reunion procedure at age 6 and classified as either having a 'secure' (B), 'avoidant' (A), 'ambivalent' (C), 'disorganized controlling' (Dcontrol) or 'behaviourally disorganized' (BehD) attachment to their caregiver. BI was also assessed with an observational measure at age 6, while maternal anxiety was assessed when the children were 14 years old. Neuroticism and IU were measured when participants were 21 years old. Attachment (specifically C and Dcontrol) and BI were both independently positively related to IU, a finding that remained after controlling for maternal anxiety and neuroticism. Attachment and BI had no interacting effect on the development of IU. Maternal anxiety was positively related to child BI and insecure attachment but not IU. This study is the first to empirically confirm a link between both ambivalent and disorganized controlling attachment patterns, as well as behavioural inhibition, in preschool children to the development of intolerance of uncertainty in adulthood and thus has not only etiological and preventative implications for generalized anxiety disorder but also for other disorders related to IU.

Keywords: attachment; behavioural inhibition; intolerance of uncertainty; neuroticism; maternal anxiety

Introduction

Identifying childhood risk factors for anxiety disorders has been a constant challenge for researchers aiming to develop effective methods to reduce the prevalence of adult anxiety disorders. Generalized anxiety is highly prevalent as it overburdens both general primary care and specialized medical practices in comparison to other anxiety disorders, however it is least encountered in mental health settings (for review see Koerner, Dugas, Savard, Gaudette, Turcotte, & Marchand, 2004; Rapee, 1991). Intolerance of uncertainty, the tendency to react negatively to uncertain situations, has been identified as an important cognitive component of generalized anxiety disorder, but little is known about its etiology (Dugas, Buhr & Ladouceur, 2004). Although insecure attachment has long been proposed as a childhood risk factor for generalized anxiety (Cassidy, 1995), specifically through its influence on intolerance of uncertainty (Dugas et al., 2004), few studies have empirically examined its links to generalized anxiety disorder (Cassidy, Lichtenstein-Phelps, Sibrava, Thomas & Borkovec, 2009; Tan, Moulding, Nedeljkovic & Kyrios, 2010) and none have looked at its role in the development of intolerance of uncertainty. Furthermore, child temperament, particularly behavioural inhibition, characterized by fearful reactions to the unfamiliar, has also been identified as a risk factor for anxiety disorders (Biederman, Rosenbaum, Hirshfeld, Faraone, Bolduc, Gersten, et al., 1990; Biederman, Rosenbaum, Chaloff, & Kagan, 1995; Crockenberg & Leerkes 2006; Hudson & Rapee, 2004; Vasey & Dadds, 2001). However, relatively few studies have specifically examined the effects of behavioural inhibition on the development of generalized anxiety disorder (Mick & Telch, 1998; Muris & Meesters, 2002; Muris, Merckelbach, Wessel & van de Ven, 1999; Wittchen, Kessler, Pfister & Lieb, 2000). The studies that do exist are mostly retrospective in nature or use parent report measures of behavioural inhibition, which are more subject to bias than observational measure (Kagan & Snidman, 2004). No study has explicitly examined the influence of behavioural inhibition on the development of intolerance of uncertainty. The present study therefore examines longitudinally the independent and interactive effects of attachment and behavioural inhibition in preschoolers on the development of intolerance of uncertainty in young adulthood.

Intolerance of uncertainty

Dugas and colleagues (2004, p.143) have defined intolerance of uncertainty (IU) as 'the tendency to react negatively on an emotional, cognitive, and behavioural level to uncertain situations and events'. Intolerance of uncertainty is said to act as a cognitive filter in ambiguous situations leading to negative interpretations and is a distinct precursor to worry, the main symptom in anxiety disorders, particularly generalized anxiety (Dugas, Freeston & Ladouceur, 1997; Dugas, Gagnon, Ladouceur & Freeston, 1998; Dugas, Marchand & Ladouceur, 2005; Freeston, Rhéaume, Letarte, Dugas & Ladouceur, 1994; Ladouceur, Gosselin & Dugas, 2000). Therefore identifying the causes of intolerance of uncertainty could help in prevention and in development of treatments for these significant disorders.

Generalized anxiety disorder (GAD) has been empirically linked to intolerance of uncertainty (Dugas, et al., 1998, 2005; Dugas, Savard, Gaudet, Turcotte, Laugesen, Robichaud et al., 2007; Freeston et al., 1994; Gentes & Ruscio, 2011). Although patients with other anxiety disorders can also experience intolerance of uncertainty, Dugas and colleagues (2004) suggested that the increased specificity of IU in generalized anxiety may be due to the diffuse nature of the anxiety in patients with GAD. Patients with GAD have a low threshold for intolerance of uncertainty related to a wide range of subjects and contexts, whereas patients with other anxiety disorders have much more specific worries. It has been suggested that this 'generalized cognitive filter' may develop quite early in childhood (Cassidy, 1995; Dugas et al., 2004). In five year-old children, for example, negative expectations predicted symptoms of overanxious or generalized anxiety disorder a year later, even after controlling for internalizing problems (Warren, Emde & Sroufe, 2000). Furthermore, when five to nine year-olds were asked to interpret ambiguous scenarios, their cognitions related to threat and distress were predictive of anxiety symptoms over a three year span (Creswell, Shildrick & Field, 2011).

Lack of control in early childhood over a situation has also been linked to intolerance of uncertainty and anxiety. Chorpita & Barlow (1998) suggested that a lack of control in a child's environment or exposure to uncontrollable events can lead a child to eventually

interpret the world as uncontrollable and frightening, increasing vulnerability for the development of anxiety disorders. Furthermore, having a low threshold for tolerating uncertainty or a temperamental tendency to avoid novel circumstances, can lead a child to avoid uncertain or ambiguous situations in an attempt to control his anxiety, with the effect that anxious symptoms are maintained (Manassis & Bradley, 1994). Intolerance of uncertainty has been related to worry throughout different developmental stages (adolescence, young adulthood and adulthood) (Dugas et al., 2004). Individuals with this cognitive schema find ambiguous situations very distressing. They tend to react negatively to uncertain events and this regardless of the probability that this event will happen or not (Dugas et al., 1998). Uncertainty is so distressing that individuals with IU would rather face a problem with a definite negative outcome than one with an uncertain outcome (Dugas et al., 2004). Developing IU at an early age can negatively impact an individual throughout his life. Since daily life is full of uncertain situations, being unable to function with uncertainty or cope with ambiguity would put a person at great risk for constant worry and anxiety.

Although many studies have been conducted on developmental risk factors of anxiety disorders, few have focused on generalized anxiety disorder and none have examined the development of intolerance of uncertainty. Furthermore, when examining childhood anxiety studies, most studies have grouped together anxiety disorders (Warren, Huston, Egeland & Sroufe, 1997; Shamir-Essakow, Ungerer & Rapee, 2005) making it difficult to relate risk factors to specific disorders or symptoms. Intolerance of uncertainty has been most consistently linked to generalized anxiety (Dugas et al., 1998; Dugas et al., 2007; Freeston et al., 1994; Dugas et al., 2005), but has also been associated with other anxiety disorders and even depression (Dugas et al., 2004; Dupuy & Ladouceur, 2008; Gentes & Ruscio, 2011; Ferreri, Lapp & Peretti, 2011; McEvoy & Mahoney, 2011). Therefore, preventing the development of intolerance of uncertainty would not only put an individual at lower risk to develop GAD, but also other psychopathologies. Identifying risk factors for the development of intolerance of uncertainty would not only contribute to the etiological model of IU, but also to the identification of potential targets for early intervention. Among the important factors associated with the development of intolerance of uncertainty are quality of child-caregiver attachment relationship and behavioural inhibition. Both have been linked to worry,

lower threshold for uncertainty and lack of control over one's environment, all leading to increased risk for anxiety disorders (Cassidy, 1995; Hudson & Rapee, 2004).

Attachment, uncertainty and risk of anxiety

The quality of the caregiver-offspring affective bond, known as attachment, typically forms between the child and a significant adult (generally the parent) during the first year of life (Bowlby (1969/1982). Bowlby (1969/1982; Belsky, 1999) described attachment as a biological system that, when activated by a stressful or threatening situation, activates proximity seeking behaviours. Bowlby (1973) also postulated that attachment plays an important role in the development of anxiety disorders.

According to attachment theory, in everyday or new and uncertain situations, the child can use a primary caregiver, such as a parent, as a 'secure base' from which to explore the environment. When a child encounters a frightening or threatening situation, he or she can seek the physical proximity and the comfort of a caregiver to diminish psychological distress or to avoid physical danger (Ainsworth, Blehar, Waters & Wall, 1978; Goldberg, 2000). Through these experiences, the child acquires knowledge about not only the physical environment but also about the self (by learning to regulate distress) and others (by integrating the expected behaviours of others in response to the child's needs).

Individual differences observed in child behaviour in stressful situations depend, in part, on the child's interpretation of caregiver behaviour and on expectations of his caregiver's responses to his needs for comfort and care (Goldberg, 2000, 2001; Goldberg, Blokland & Myhal, 2003). The child adapts his or her behaviour to caregiver responses and develops an associated attachment pattern. For example, a caregiver can be sensitive to a child's needs and respond adequately with timely, warm, and predictable responses contingent on the child's behaviours. This helps the child reduce distress in stressful situations and develop an 'internal working model' representing a sense of competence in his or her own capacities to self-regulate (Bretherton, 1990). The child learns that the caregiver can be counted on to help him regulate his emotions and for comfort when needed (Bowlby, 1969/1982; Ainsworth et al., 1978). The child will therefore develop a secure attachment

pattern that will in turn help in the development of the child's own self-regulation (Cassidy, 1994; Kopp, 1982, 1989; Thompson, 1994). However, if parental responses are unstable or inconsistent, a child may not learn to adequately regulate distress. This could lead to a sense of uncertainty in relationships and in general, which will put the child at risk of developing an insecure attachment pattern with his caregiver (Bowlby 1969/1982; Ainsworth et al., 1978). Attachment theory states that the relationship between a parent and a child plays a crucial role in the development and future adaptation of the child and according to Bowlby (1969/1982), dysfunctional mother-child relationships are major risk factors for later psychopathology.

Three attachment patterns were first identified in infancy: secure (B), insecure-avoidant (A) and insecure-ambivalent (C) attachment (Ainsworth et al., 1978). In general, children that view their parent as accessible and sensitive to their physical and emotional needs develop an organized and secure attachment. Parents tend to be sensitive, comforting in times of stress and consistent in their responses to the child's needs. Secure attachment has the least associated behavioural problems (Brumariu & Kerns, 2010; Fearon, Bakermans-Kranenburg, van IJzendoorn, Lapsley & Roisman, 2010; Groh, Roisman, van IJzendoorn, Bakermans-Kranenburg & Fearon, 2012; Moss, Rousseau, Parent, St-Laurent & Saintonge, 1998; Moss, Smolla, Cyr, Dubois-Comtois, Mazzarello & Berthiaume, 2006; Weinfield, Sroufe, Egeland & Carlson, 1999). Children with insecure-avoidant attachment typically have parents that are less sensitive to their child's distress and tend to show more rejecting behaviours towards their child compared with parents of secure children (Ainsworth et al., 1978; Bretherton, 1985). The avoidant child develops an internal representation of the parent as inaccessible and rejecting. In order to increase chances for proximity to the parent and diminish rejection, these children minimize expressions of distress (Main & Cassidy, 1988). Children who develop an insecure-ambivalent attachment (C) tend to have insensitive, inconsistent and unpredictable parents. This inconsistent parenting creates an uncertain environment and leads children to worry about the availability of their parent in time of stress as well as to represent the parent as unpredictable and unreliable. In order to increase the chances for proximity with their parent, they maximize their distress behaviours in order to attract parental attention (Ainsworth et al., 1978; Bretherton, 1985; Main & Cassidy, 1988).

Compared to children with secure attachment patterns, insecure children (insecure-avoidant and insecure-ambivalent) are more at risk of developing behavioural problems at preschool age, school age and even in adolescence, particularly in high risk populations (Burgess, Marshall, Rubin & Fox, 2003; Fearon et al., 2010; Warren et al., 1997; Weinfield et al., 1999). Furthermore, insecurely attached children are more likely to interpret ambiguous situations as more threatening, hostile or negative than securely attached children (Cassidy, Kirsh, Scolton & Parke, 1996).

Insecure avoidant and ambivalent attachment patterns, like the secure pattern, are considered to be organized responses to differences in parental behaviour. However, a fourth attachment classification, insecure-disorganized (D), was identified by Main & Solomon (1990) to describe children displaying unusual, conflicting or disoriented behaviours such as stereotyped behaviours, freezing in place or being in a trance-like state, instead of consistently seeking proximity or avoiding the parent in times of stress. Disorganized attachment is thus characterized by the absence of a coherent strategy to regulate comfort seeking behaviour. When the caregiver is simultaneously a potential source of security and of fear and anxiety to the child (such as in maltreating families or those affected by mental illness), this constant uncertainty about the reactions or availability of the parent can severely affect the quality of the parent-child bond (Lyons-Ruth & Jacobvitz, 1999; Main & Solomon, 1990; Moss, Bureau, Cyr, Mongeau & St-Laurent, 2004). Main and Cassidy (1988) further observed a transition to controlling behaviour involving parent-child role reversal between infancy and age 6. Moss et al. (2004) verified that two thirds of preschoolers classified as disorganized assumed control of the parent-child relationship by age 7 in either a punitive or caregiving manner. Children with a controlling-caregiving attachment are helpful, positive, cheerful and polite, behaving in a protective or motivating way while structuring the interactions with their parent. On the other hand, controlling-punitive children use bossy, hostile and aggressive behaviours toward the parent, such as commands, threats or physical aggression, in order to control them (Moss, Bureau, St-Laurent & Tarabulsy, 2011; Moss, Cyr & Dubois-Comtois, 2004). Solomon and colleagues (1995) have described the transition to controlling behaviour as an attempt to resolve the anxiety-provoking paradox of a frightening caregiver. These children try to control their uncertain environment by assuming

the role of the parent. Hence, unable to tolerate the uncertainty and fear, they attempt to control their surroundings, including their parent, in order to regulate their own anxiety through this role reversal (Solomon, George & De Jong, 1995). However, some children stay disorganized and do not reorganize their attachment behaviours, continuing to display the disorganized attachment behaviours seen in infancy. In general, children with disorganized attachment are most at risk to develop behavioural problems compared to secure or insecure attachment types (Carlson, 1998; Moss, Cyr & Dubois-Comtois, 2004; Moss et al., 2006; O'Connor, Bureau, McCartney & Lyons-Ruth, 2011).

Certain types of attachment, namely insecure-ambivalent attachment or one that results in role reversal were proposed as risk factors for the development of intolerance of uncertainty (Cassidy, 1995; Dugas et al., 2004). Cassidy (1995) described that early childhood experiences of 'role-reversal/enmeshment' (comparable to experiences of ambivalent and disorganized controlling attachment) between a child and their parent, could lead to increased worry and eventual development of generalized anxiety. She postulated that enduring anxiety might result from constantly worrying about the availability of one's parent or from having to take care of a parent who did not assist the child in dealing with their own distress. Cassidy and colleagues (2009) compared adult patients with clinically severe generalized anxiety disorder and controls using the Perceptions of Adults Attachment Questionnaire (PAAQ: Lichtenstein & Cassidy, 1991). The participants' childhood attachment perceptions were measured by three subscales ('rejection/neglect', 'role-reversal/enmeshment' and 'being loved') as well as current adulthood attachment. Significant differences between GAD patients and controls were found, with GAD patients reporting having experienced higher instances of 'role-reversal/enmeshment' during childhood than controls. Although, they also reported higher instances of 'rejection/neglect' and lower instances of 'being loved' during childhood (Cassidy et al., 2009). Childhood attachment no longer differentiated GAD patients from controls once current adulthood attachment was taking into account. Another retrospective study examined the effect of 'role-reversal/enmeshment' (measured with the PAAQ), in addition to intolerance to uncertainty and negative beliefs, on the development of GAD in a non-clinical population (Tan et al., 2010). Although, 'role-reversal/enmeshment' was related to GAD, it failed to reach statistical

significance once depression was accounted for. However, even after controlling for depression, IU predicted GAD above and beyond negative beliefs. Tan and colleagues (2010) also found that 'role-reversal/enmeshment' was weakly but significantly positively related to IU. A limitation of these studies is the use of retrospective questionnaires to assess childhood attachment. No studies have used observational separation-reunion based measures (Ainsworth et al., 1978; Cassidy & Marvin, 1992; Main & Cassidy, 1988) in a prospective manner to examine the influence of childhood attachment relationships on the development of IU in adulthood.

Dugas et al. (2004) also proposed how an attachment relationship characterized by role-reversal could lead to intolerance of uncertainty. For example, a child with disorganized controlling-caregiving attachment to a severely depressed mother who is unable to deal with daily problems may need to be constantly vigilant in case a problem arises and the mother needs help. In such a case, any unplanned event may be seen as a potential problem and uncertainty therefore could be seen as frightening and anxiety provoking for the child. Furthermore, the lack of a proper role model for learning coping skills can compound the threatening perception of uncertainty. If the child does not learn to cope with uncertainty, this could lead to later anxiety (Dugas et al., 2004). The proposal of Dugas et al. (2004) could be expanded to insecure attachment as well, particularly to ambivalent attachment. An ambivalent attachment relationship is characterized by inconsistent parenting and a child's view of the parent as unpredictable. Not knowing when or if his needs will be fulfilled could lead a child to perceive uncertainty as threatening and to chronically worry. In support of this idea, Warren and colleagues (1997) found that, in an at-risk sample, infant ambivalent attachment predicted child and adolescent anxiety disorders (17 years later) after controlling for new born temperament and maternal anxiety (Warren et al 1997). Brown & White (2010) found similar results in a cross sectional study with 7 to 18 years-old children with a primary anxiety diagnosis, where children with self-reported ambivalent attachment reported higher rates of worry compared with other children. Although data of specific anxiety diagnoses were available, results relating to anxiety disorders were not reported. In fact, few studies examined attachment in relation to anxiety disorders (Brumariu & Kerns, 2010). A recent meta-analysis showed that although insecurity, specifically ambivalent attachment, was most

frequently related to anxiety, few studies used observational attachment measures, many only compared security and insecurity and not specific attachment classifications, and outcomes measures greatly varied across studies contributing to mixed results (Brumariu & Kerns, 2010).

Behavioural inhibition, uncertainty and risk of anxiety

Behavioural inhibition (BI), described as fearful reactions or a tendency to withdraw in the face of novel situations, objects or people, is one of the most widely studied child temperament profiles (Calkins & Fox 1992, 1994; Fox, Henderson, Rubin, Calkins & Schmidt, 2001; Garcia-Coll, Kagan & Reznick, 1984; Kagan, 1999, 2000; Kagan, Reznick & Snidman, 1988; Kagan & Saudino, 2001; Stevenson-Hinde & Marshall, 1999). Observational laboratory paradigms involving novel and unfamiliar situations and people are considered to be the gold standard for measuring behavioural inhibition (Garcia-Coll et al., 1984; Kagan & Snidman, 2004). BI has also been established as an important risk factor for internalizing behavioural problems and anxiety disorders (Biederman et al., 1990, 1995; Crockenberg & Leerkes, 2006; Hudson & Rapee, 2004; Rubin, Coplan & Bowker, 2009). Biological concepts of physiological reactivity as well as self-regulation are at the core of BI (Goldsmith & Campos, 1990; Kopp, 1982; Lecuyer-Maus & Houck, 2002; Rothbart & DerryBerry, 1981). Therefore, a child can not only react differently (in terms of latency, intensity, frequency and duration) to a given stimulus, but can also differentially modulate these reactions (for example, by inhibiting them or not). According to Kagan and colleagues (1987, 1988), from birth the sympathetic nervous system of inhibited children, commonly related to the fight or flight response, has a lower activation threshold than in uninhibited children, particularly to novel, uncertain or ambiguous stimuli (Kagan, 1999; Kagan & Snidman, 2004). Therefore, behaviourally inhibited children would require less intense stimuli to activate their sympathetic nervous system compared with uninhibited children and vice versa (Kagan, 1999; Kagan, Reznick & Snidman, 1987, 1988).

Such differences in activation thresholds are thought to be the primary mechanism linking behavioural inhibition to development of behavioural problems (Kagan, 1999; Kagan et al., 1987, 1988). A physiological vulnerability from birth to react more rapidly or intensely

(i.e. a lower sympathetic activation threshold) means that behaviourally inhibited children are at increased risk to react intensely to novel or uncertain situations or stimuli before having developed self-regulation. They would therefore, tend to avoid novel situations early in life, curbing habituation to such situations and maintaining these behaviours, hence putting them at risk to develop internalizing problems and anxiety disorders (Vasey & Dadds, 2001; Lonigan & Phillips, 2001; Kagan, 1999). For example, children with BI have more problems with stress regulation, such as elevated heart rate (activation of the sympathetic nervous system) (Kagan et al., 1987, 1988) and differing patterns of cortisol secretion compared with uninhibited children (see Gunnar, 1994, 2001). Increased stress reactivity has been linked to internalizing problems and anxiety disorders (Hirshfeld, Rosenbaum, Biederman, Bolduc, Faraone, Snidman et al., 1992; Kagan, Snidman, Zentner & Petersen, 1999; Keuler, Schmidt, Van Hulle, Lemery-Chalfant & Goldsmith, 2011; Schwartz, Snidman & Kagan, 1999; Shamir-Essakow et al., 2005).

An increased sensitivity to novel, uncertain or ambiguous situations has also been documented in behaviourally inhibited children (Kagan & Snidman, 2004). In theoretical definitions of behavioural inhibition, intolerance of uncertainty plays a key role. For example, Zentner & Bates (2008, p.17) stated that 'Kagan sees the core feature of inhibition as an intolerance of uncertainty rather than a proneness to fear'. Furthermore, definitions of behavioural inhibition have emphasized reference to the initial tendency to react to unfamiliar events or novelty (Garcia-Coll et al., 1984; Degnan & Fox, 2007) and Reznick and colleagues (1989, p.30) defined behavioural inhibition as a '...vulnerability to the uncertainty caused by unfamiliar events that cannot be assimilated easily'. For example, children identified as behaviourally inhibited attend more or show greater vigilance to threat or novelty and are less able to disengage from such stimuli, than do noninhibited children (for review see Blackford & Pine, 2012; Degnan & Fox, 2007). When asked to perform an ambiguous task (i.e.: rating levels of fear in a happy face), adolescents who have been identified as behaviourally inhibited since toddlerhood had abnormally high levels of amygdala activation compared with individuals that were consistently noninhibited (Perez-Edgar, Roberson-Nay, Hardin, Poeth, Guyer, Nelson et al., 2007). Similarly, when presented with emotionally neutral faces, young adults previously characterized as BI at two years of age, exhibited amygdala

hyperactivity to novel faces compared to familiar ones (Schwartz, Wright, Shin, Kagan & Rauch, 2003). Just as a child that learns that his caregiver is unavailable or inconsistent, a BI child has heightened physiological reactions to the environment and thus acquires a perception of the world as uncertain and threatening, leading to avoidance, putting the child at risk for later intolerance to uncertainty and potential psychopathology. Although numerous studies have linked behavioural inhibition with anxiety disorders (see Hudson & Rapee, 2004), no study has specifically examined this child temperament trait in relation to intolerance of uncertainty.

Attachment, behavioural inhibition and anxiety disorders

Research supports the idea that attachment and temperament are separate constructs (reviewed in Vaughn, Bost & van Ijzendoorn, 2008) and several studies have documented interaction effects between these two variables on later childhood outcomes (Bohlin, Hagekull & Andersson, 2005; Nachmias, Gunnar, Mangelsdorf, Parritz & Buss, 1996; Schieche & Spangler, 2005; van Brakel, Muris, Bögels & Thomassen, 2006). Insecure attachment has been shown to moderate associations between behavioural inhibition and anxiety disorders, although results are inconsistent (see Vaughn et al., 2008). For example, inhibited toddlers with an insecure attachment had more difficulties in stress regulation than those with a secure attachment (Nachmias et al., 1996; Schieche & Spangler, 2005). Schieche & Spangler (2005) observed that insecure toddlers, particularly with an ambivalent or disorganized attachment, reacted more strongly (in terms of cortisol activation) to stressful situations if they were extremely inhibited compared with other children. Similarly, inhibited children with an insecure attachment reported more overall anxiety symptoms (excluding social anxiety) (Muris, Brakel, Arntz & Schouten, 2011), although sometimes these interaction effects were very small (accounting for less than 1% of the variance) (van Brakel et al., 2006). However, not all studies have demonstrated such interaction effects (Muris & Meesters, 2002; van Bakel & Riksen-Walraven, 2004). For example, Shamir-Essakow et al. (2005) found that insecure attachment and inhibited temperament independently predicted childhood anxiety, with no interaction effect between attachment and behavioural inhibition, even after controlling for maternal anxiety.

Some methodological aspects must be considered when assessing the results of studies that link attachment and behavioural inhibition to later outcomes. Not all studies that addressed this question, particularly in relation to anxiety disorders or related concepts, have used observational measures, longitudinal designs, examined interaction effects between main variables or considered all attachment groups. Two studies examining the effects of attachment and BI on the development of anxiety used observational measures of temperament, as well as attachment as opposed to questionnaires (Shamir-Essakow et al., 2005; Warren et al, 1997). In general, observational measures of temperament are considered to be more objective than questionnaires (Kagan & Snidman, 2004). However, one study did not examine interaction effects (Warren et al., 1997) and the other study's sample size was deemed too small to accurately detect an interaction (Shamir-Essakow et al., 2005). To our knowledge only Warren et al. (1997) employed a longitudinal design, however, they did not consider all attachment categories (A, B, C, D) (Warren et al., 1997). Although disorganized attachment is most consistently associated with problematic outcomes, this is not necessarily the case for disorganized subtypes and few researchers have included these in their studies (Lyons-Ruth & Jacobvitz, 1999; Moss et al., 1998; 2004; 2006; O'Connor, Bureau, McCartney & Lyons-Ruth, 2011). Furthemore, few studies have examined longitudinal sequelae of disorganization (Moss et al., 2004, 2006; O'Connor et al., 2011) and only two have compared the different disorganized subtypes in relation to the development of behavioural problems (Moss et al., 2004; O'Connor et al., 2011). However, neither study included a temperament measure. Therefore, using observational measures of behavioural inhibition and all attachment classifications in a longitudinal design in order to examine the etiology of intolerance of uncertainty would greatly contribute to the field.

Important factors to consider: Neuroticism and maternal anxiety

Many additional factors must be considered when studying cognitive concepts related to anxiety disorders. The personality trait of neuroticism, characterized by vulnerability to psychological distress (Costa & McCrae, 1992), has been identified as a risk factor for psychopathology in adulthood. Neuroticism has specifically been associated with worry, tendency to avoid ambiguous situations, anxiety disorders and specifically generalized anxiety disorder (De Bruin, Rassin & Muris, 2007; Lommen, Engelhard & van den Hout,

2010; Rosselini & Brown, 2010; Vreeke & Muris, 2012). Individuals that score high on neuroticism have a tendency to experience negative emotions, such as fear, anxiety, sadness, embarrassment, guilt and anger more frequently, cope less well with stress and perceive their surroundings as threatening more easily (Costa & McCrae, 1992; Tellegen, 1985; Watson, Clark & Chmielewski, 2008). Furthermore, neuroticism has been found to be directly related to intolerance of uncertainty (De Bruin et al., 2007; Sexton, Norton, Walker & Norton, 2003). Therefore, this variable should be controlled when examining associations with IU.

Moreover, maternal anxiety may contribute to the development of child anxiety disorders through both genetics and modeling of anxious behaviours (Gerull & Rapee, 2002; Hudson & Rapee, 2004). Maternal anxiety has been associated with higher levels of child insecure attachment, behavioural inhibition and anxiety disorders (Biederman, Rosenbaum, Bolduc-Murphy, Faraone, Chaloff, Hirshfeld, et al., 1993; Hirshfeld, Biederman, Brody, Faraone & Rosenbaum, 1997; Manassis, Bradley, Goldberg, Hood & Swinson, 1995). Therefore, just as with neuroticism, maternal anxiety is an important factor to control for when studying child anxiety and its cognitive components.

Objectives

The main objective of the current study was to examine the independent and interactive contributions of behavioural inhibition and attachment at preschool age, when children are between 5 and 7 years-old, to the development of intolerance of uncertainty in adulthood, at approximately 21 years of age. Based on previous empirical work and models of the development of anxiety, we predicted that BI would independently contribute to the development of intolerance of uncertainty. Also based on previous work (Cassidy, 1995; Dugas et al., 2004; Warren et al., 1997), insecure-ambivalent and disorganized controlling attachment types were predicted to both be independently associated with intolerance of uncertainty. Since studies describing the interactive effects of behavioural inhibition and insecure attachment have reported inconsistent results, we tested this interaction effect on the risk of developing intolerance of uncertainty without a prior prediction. As both neuroticism and maternal anxiety have been found to be associated with anxiety disorders (and intolerance of uncertainty), they were included as covariates.

We used an observational measure of child behavioural inhibition previously validated with toddlers and adapted it to an older sample of children (BIM; Zdebik, 2006; Chapter 2, this thesis). Assessment involved validating the BIM against adult measures related to shyness and also testing its divergent validity in relation to attachment. It was predicted that the BIM would not be related to attachment classification but that it would be positively related to measures of adulthood shyness.

Finally, we examined the relation of maternal anxiety to both attachment and behavioural inhibition to confirm previous research linking these variables. We predicted that children with insecure attachment patterns were more likely to have anxious mothers compared with secure children and that those with higher behavioural inhibition scores were also more likely to have anxious mothers compared with other children.

This study will be the first to examine the longitudinal association between child behavioural inhibition and attachment, measured when children are between 5 and 7 years old, using observational measures and examining specific attachment subgroups as predictors of intolerance of uncertainty in adulthood, when participants are approximately 21 years of age. It will not only add to the sparse literature on etiology of IU, but could potentially aid in prevention and early treatment for disorders associated with this cognitive schema.

Methods

Participants

Study participants were 60 French-speaking mother-child dyads who were part of an ongoing longitudinal study examining the influence of the parent-child relationship on developmental adaptation (see Moss & St-Laurent, 2001; Moss et al., 2006). Participants were part of a larger initial sample recruited from preschools in the Montreal area when children were aged between 3 and 5 years old (Moss, Parent, Gosselin, Rousseau & St-Laurent, 1996). Measures for the current study were collected two years after the initial recruitment. At Time 1 of the current study (T1) when children were aged between 5 and 7 years-old (N = 127; M age = 75 months, SD = 12.6; 69 girls). The sample was heterogeneous

with respect to income level with 25% of families earning under $20,000 in 1992 (Canadian dollars), 43% earning between 20,000$ and 50,000$, and 32% earning 50,000$ and above. Thirty-six per cent of participants lived in a mother-headed home, whereas the rest were from two parent families. Average maternal education was 14.0 years (*SD* = 3.0), with 40% of mothers having at least 12 years of education and the rest having some college or university level schooling. Mean maternal age at initial intake was 28.6 years (*SD* = 3.7, range = 21 to 42 years).

Time 2 (T2) measures were taken 8 years later, when children had a mean age of 13.7 years (*SD* = .64, range = 12.6 to 15.1 years, *N* = 79, 47 girls). Family income was distributed as follows: 9% of families earned under $20,000 in 2002, 39% earned between 20,000$ and 50,000$, and 52% earned 50,000$ and above. The sample was similarly heterogeneous to the previous time point in education level. Thirty per cent of mothers had primary or secondary school diplomas, and 70% had a college or university degree. Thirty-three per cent of families were mother-headed single parent homes with the remainder two-parent families.

Approximately 7 years later, at Time 3 (T3), participants were young adults in their early twenties with a mean age of 21.3 years (*SD* = .87, range = 20 to 23 years, *N* = 60, 38 young women). Seventy-three per cent of participants still lived at home at the time of the study and 27% were in a relationship. 50% of the young adults earned under $10,000 in 2008, 45% between 10,000$ and 30,000$, and 5% 30,000$ and above. Thirty-two per cent of participants had completed a high school degree, 43% had college level schooling and 25% had some university level training.

60 participants completed all three time points. 53% of participants were lost to attrition from the first time point of the study (see Moss et al., 1998). From the adolescent phase (Time 2), 24% (N= 19) of participants did not complete the young adult phase (Time 3): 6 refused to participate, 7 never responded to repeated contacts by the project's research assistants, 3 had non-valid phone numbers, 2 moved away and 1 accepted to participate but did not attend the laboratory appointment. ANOVA and chi-square analyses of socio-demographic variables (age, gender, maternal education, family income, type of family) were conducted to

compare participants lost to attrition with those remaining in the study. These analyses revealed no significant differences between T1 and T2 and between T2 and T3. However, the proportion of male participants dropped from T1 to T3, (χ^2 (1, N= 127) = 4.51, p= .05) and mothers of children still participating in the study had more years of education at T1 (M = 14.7 years, $S.D.$ = 2.97) compared to mothers (M = 13.2 years, $S.D.$ = 2.85) whose children did not participate in T3 (t = 3.04, p< .05).

General Procedure

Participants were contacted by telephone two weeks prior to each phase of the project and were sent questionnaires to complete at home and bring to the laboratory. When children were 5 to 7 years old (T1), mothers and their children were invited to the laboratory to complete an interactive play task, which included a free play session, and to participate in a separation-reunion procedure. Upon arrival, the child and the mother were greeted by two research assistants who collected the questionnaires, explained the procedure and invited the dyad into the experimental room. One research assistant introduced the interactive task to the mother-child dyad which consisted of a mock grocery store within which the dyad collected items from a given grocery list. They were given 2 minutes to explore the task and toys (free play) before the mother was asked to leave the room for about 5 minutes while the child completed the first task alone. The mother then came back to the room to complete the task with her child (20 minutes). The task was followed by a 45 minute separation during which the mother left the room to fill out questionnaires with an experimenter and the child completed problem-solving tasks with another experimenter. An unstructured 5-minute period during which the child was free to play with toys in the room preceded each reunion. Without being given any particular instructions, the mother was then asked to rejoin her child in the experimental room. The reunion lasted 5 minutes. Following the reunion period, the dyad stayed in the room for a 10 minute snack-time. A second separation (about 30 minutes) followed the snack-time, structured similarly to the first separation, followed by a 5 minute reunion.

The child's behaviours during both reunion periods were used for attachment classification (described below). This procedure, akin to the procedure by Main and Cassidy

(1988), was used because the children were of preschool and school age and its validity for classifying attachment behaviour in children in this age range has been demonstrated in several studies (Cassidy, 1988; Cohn, 1990; Groh et al., 2012; Moss et al., 1996, 1998, 2004, 2006; Moss & St-Laurent, 2001; Solomon et al., 1995). The child's behaviours during the interactive task free-play were used to code behavioural inhibition as described below. Finally in Time 1, in addition to a demographic questionnaire, the mothers also completed a questionnaire measuring the child's vocabulary ability.

During the adolescent phase of the study (T2), when the children were between 13 and 15 years-old, they were invited to fill out questionnaires at the laboratory. None of the children's questionnaires from this phase were used in the current study. Mothers once again filled out demographic questionnaires and also the Symptom Checklist 90-Revised (SCL-90-R; Derogatis, 1994). At T3, the young adult phase, participants came to the laboratory without their parents. During this phase of the study, they completed the Revised NEO Personality Inventory (NEO PI-R; Costa, & McCrae, 1992) and the Intolerance of Uncertainty-12 Short form (IUS-12; Carleton, Norton & Asmundson, 2007) in addition to filling demographic information about themselves. Participants were given 20$ for their participation in each phase of the study.

Instruments

Attachment classification and distribution. The Preschool Attachment Classification System (Cassidy & Marvin, 1992) for the 5-year-olds and the Main and Cassidy (1988) system for the 6-7-year-olds, which are conceptually similar, were used to classify the children's reunion behaviours. Both systems use a six-category attachment coding scheme to classify children into three organized (secure, insecure-avoidant and insecure-ambivalent) and three disorganized (controlling-caregiver, controlling-punitive and insecure-other) attachment patterns. Children with a secure (B) attachment pattern use their caregiver as a secure base that facilitates their exploration of the environment and the parent-child interactions can be characterized as pleasurable. When they are reunited with their mother after a separation they are relaxed and respond in a warm, confident and positive manner and return to their exploration. Children with an insecure-avoidant (A) pattern display little

physical and affective interaction with their caregiver. They tend to minimize physical contact and avoid, ignore or do not elaborate on verbal contact with their parent. The insecure-ambivalent/dependent (C) attachment pattern is characterized by exaggerated immature behaviours and dependency which hinders exploration, as well as heightened distress upon separation. During reunions, the child typically greatly seeks proximity to the caregiver and displays babyish or angry behaviours while exhibiting some avoidance. Although the A and C attachment patterns are insecure, like the secure B pattern they are considered to be organized in terms of displayed behaviours and representation of the accessibility of the attachment figure in times of stress. In contrast, disorganized attachment categories (D) are considered to have disorganized caregiver representations with variant levels of behavioural organization in times of stress (Main & Cassidy, 1988). Children with disorganized insecure-controlling attachment attempt to compensate with role-reversal behaviours (Main & Cassidy, 1988; Teti, 1999). Controlling-caregiving (Ccare) children try to compensate and organize the stressful situation by taking care of the parent, by for example cheering up the parent or helpfully guiding the parent in the situation. On the other hand, controlling-punitive (Cpun) children use hostile, directive behaviour with their caregiver, which may include verbal threats or harsh commands. Some children may display a general controlling style that includes both caregiving and punitive elements, directing the parent's activities and conversational exchanges. Finally, a third group of disorganized children called behaviourally-disorganized (BehD) seem unable to use the caregiver as a secure base from which to explore their environment, however, they do not display clear pattern of A or C attachment. These children, like disorganized infants, seem disordered, confused or apprehensive, and display incomplete, undirected or unusual movements or behaviours, and may show a combination of A and C attachment patterns.

Videotaped reunions were coded by two coders who were unaware of participant scores on any other measures of the current study. The author E. Moss coded half of the 127 video tapes and the remainder was coded by a graduate student. Both coders were trained by R. Marvin and achieved reliability with him on a separate sample of tapes. All discrepancies were resolved by reviewing the tapes until consensus was achieved. Reliability for the scores of the 5 year-old children was calculated separately from that of the 6 and 7 year-old

children, which were comparable and both indicated excellent agreement (kappa = .86 and .88, respectively). Overall agreement for the major classifications (A, B, C, and D) was 88% (α = .81), calculated on 30% of the sample. Reliability was also calculated for the disorganized classification subtypes for the 14 D videotapes in the reliability pool. Agreement was as follows: 4/4 (100%) for Ccare, 4/5 (80%) for Cpun, and 4/6 (67%) for BehD (overall agreement for the D subtypes was thus 80%). In the current study, in order to test if disorganized controlling and ambivalent attachment patterns are related to the development of intolerance of uncertainty, both disorganized controlling subtypes were combined for analyses as they are theoretically similar in terms of the children's role reversal and internal working models of their caregiver related to feeling unprotected and vulnerable (Moss et al., 2004). The behaviourally-disorganized, although small, was left as a distinct category. There were no significant differences in the relative proportions of the various attachment classifications between T1 and T2, T1 and T3 or T2 and T3 (Table 1; Chi square tests; all p>.05), indicating no differences in attrition rates. As main analyses were multivariate regressions, attachment was coded into dummy variables contrasting each specified attachment group (A, C, Dcontrol, BehD) to the reference secure group (B) (Cohen & Cohen, 1983). In order to identify how different attachment groups (A, B, C, Dcontrol and BehD) may differ on socio-demographic variables, correlations, t-tests and Chi squares were performed with participant age, gender, maternal age, maternal education and family income. Attachment groups did not differ on any of these socio-demographic variables (all p> .05).

Insert Table 1

Behavioural Inhibition Measure (BIM). Behavioural inhibition was measured using the Behavioural Inhibition Measure (BIM) (chapter 2, this thesis), a protocol based on the laboratory studies of Kagan and colleagues (Garcia-Coll et al., 1984; Kagan, Reznick & Gibbons, 1989) and on the Strange Situation procedure (SSP; Ainsworth et al., 1978). The SSP has all the necessary components to evaluate behavioural inhibition in children: an unfamiliar situation, novel objects, opportunity for exploration and the introduction of an

unfamiliar individual. However, Zdebik et al. (Chapter 2, this thesis) showed that only the initial free play session, even prior to the entrance of the stranger, was sufficient to observe inhibited behaviour in children, as behavioural inhibition refers to the initial negative or fearful reactions to novelty (Garcia-Coll et al., 1984; Degnan & Fox, 2007). Children's reactions to a novel room and toys even in the presence of their mother were varied enough to discern behavioural inhibition and risk for internalizing symptoms. Here, the BIM was adapted and validated for slightly older children.

Behaviours such as spontaneous vocalizations, displays of negative affect or fretting, play and proximity to the mother (within 1m, between 1 and 2m and beyond 2 m) were coded in terms of frequency and length from the videotaped free play session of the interactive task at the beginning of the laboratory visit, when the children were aged between 5 and 7 years-old. The videotaped segment used to code behavioural inhibition did not overlap with the footage used to code attachment. Frequency or duration (in seconds) of the operationalized behaviours were divided by the total length of the duration of the free play session and standardized. Scores that were not observed for over 20% of the sample were coded as either present or not (0 or 1). Composite scores were computed based on theoretical representation of a behavioural inhibited profile in the literature (Garcia-Coll et al., 1984). The BIM score was composed of the sum of reversed spontaneous vocalizations, negative affect, proximity to mother 0 to 1m, reversed proximity to mother 1 to 2 m, reversed proximity to mother 2m and over and reversed play scores, where higher scores represented higher levels of behavioural inhibition.

The BIM was previously validated in a study using principal component analysis (Zdebik, 2006; Chapter 2, this thesis) which revealed a theoretically based score describing inhibited-uninhibited behaviours. The BIM was shown to be related to validated temperament questionnaires: the Fear and Approach Scales of the revised Infant Behaviour Questionnaire (IBQ-R: Gartstein & Rothbart, 2003) and the Shyness and Sociability Scales of the Early Childhood Behavioural Questionnaire (ECBQ, Putnam, Gartstein & Rothbart, 2006) as well as an in-home observational temperament measures (Non-caregiver observational temperament assessment, N-COTA: Chapter 2, this thesis) filled out by research assistants

having observed children at home for over two hours. The BIM was also comparable to an existing laboratory-based behavioural inhibition protocol (White, McDermott, Degnan, Henderson, & Fox, 2011) and was also shown to have excellent reliability (Chapter 2, this thesis).

In the current sample, the BIM was adapted to an older sample of children, while still using the same behaviours as in the original construction of the protocol. Videotapes were coded for inhibition by the main author, who was blind to attachment classification. A second coder, trained by the main author and blind to inhibition and attachment classification, coded 15% randomly selected videotapes. Intra-class correlations between the raters ranged from .83 to 1.00 (all $p<.001$). BI was not significantly related to any of the socio-demographic variables (participant age, gender, maternal age, maternal education and family income; correlations and t-tests; all $p> .05$).

Child vocabulary. Since a large part of the BIM is related to vocalization behaviours, differences in vocalization rates could potentially be related to differences in vocabulary knowledge and proficiency. Therefore, children's vocabulary ability was measured at T1, using the French Canadian version of the Peabody Picture Vocabulary Test-Revised, *l'Échelle de vocabulaire en images Peabody* (EVIP; Dunn , Dunn & Thériault, 1993), based on a sample of 2038 French Canadian youth. The EVIP is a vocabulary assessment for children aged between 2 years and 6 months to 18 years of age. It requires no reading or writing on the child's part, making it well suited for testing shy children. The test consists of 5 trial items and 170 tests items arranged in increasing degree of difficulty. Each item is composed of 4 black and white drawings presented in a multiple choice format. The child must choose the image that best corresponds to the stimulus word that is read out by the experimenter. Although the PPVT-R measures receptive language abilities, it is designed to rapidly assess the child's range of acquired vocabulary and verbal competence as well as the child's academic aptitude.

Maternal anxiety symptoms. Maternal anxiety was measured using the Anxiety scale of the Symptom Checklist 90-Revised (SCL-90-R; Derogatis, 1994), a self-report 90-item questionnaire evaluating the intensity of a broad range of symptoms of psychopathology.

Participants rate, on a 5-point Likert-type scale, if each symptom has applied to them in the last seven days from "not at all" (0) to "extremely" (4). Symptoms are measured on 9 dimensions: somatization (SOM), obsessive-compulsive (O-C), interpersonal sensitivity (I-S), depression (DEP), anxiety (ANX), hostility (HOS), phobic anxiety (PHOB), paranoid ideation (PAR) and psychoticism (PSY). Global indices can also be compiled for overall psychological distress, intensity of symptoms and number of reported symptoms. The anxiety scale refers to symptoms of anxiety such as tension, nervousness, trembling, feelings of terror and panic, in addition to somatic manifestations. The SCL-90-R demonstrated high internal consistency, has been widely used to assess psychopathology symptoms in diverse population both in research and clinically and its validity and reliability have been well documented (Derogatis & Lynn, 1999). Only the anxiety scale (alpha = .90) was used in the current study. Total Anxiety scale score could range from 0 to 40. Since participants were from the general population, over 25% of mothers scored zero (scores ranged from 0 to 31 with a median score of 2). Therefore, the score was dichotomized and mothers scoring 10 and above were classified as 'anxious' and the remainder as 'non-anxious'.

Revised NEO Personality Inventory (NEO PI-R). The Revised NEO Personality Inventory (self-report form) (NEO PI-R; Costa & McCrae, 1992) is a five domain measure of adult personality, composed of 240 items. Participants rate statements pertaining to themselves on a 5-point Likert-type scale from 0 "strongly disagree" to 4 "strongly agree", with higher scores indicating a higher level of the trait. The five assessed personality domains are Neuroticism, Extraversion, Openness, Agreeableness and Conscientiousness. Each of the five domains (48 items each) is composed of 6 subscales (8 items each). The Neuroticism scale, on which high scores generally refers to increased proneness to psychological distress, is composed of the following subscales: Anxiety, Angry Hostility, Depression, Self-Consciousness, Impulsiveness and Vulnerability (see Table 2 for description of subscales). The neuroticism scale has been well documented as a measure of risk of psychopathology (Bienvenu, Nestadt, Samuels, Costa, Howard & Eaton, 2001; see Costa & McCrae, 1992; Silove, Marnane, Wagner, Manicavasagar & Rees, 2010). Validity and reliability of the NEO PI-R has been widely documented in several different populations and internal consistency coefficient alphas for the domain scales range from .86 to .92 and from .56 to .81 for

subscales (Costa & McCrae, 1992). The Neuroticism Scale (Cronbach's α= .86) and its subscales (Anxiety, α= .83; Angry Hostility, α= .68; Depression, α= .78; Self-Consciousness, α= .60; Impulsiveness α= .65; and Vulnerability α= .80) were used in the present study.

Intolerance of Uncertainty. The Intolerance of Uncertainty scale short form (IUS-12; Carleton et al., 2007) is a 12-item self-reported questionnaire. The IUS-12 is the short form of the original 27-item Intolerance of Uncertainty Scale (IUS-27; Freeston et al., 1994). The IUS-12 is a two-factor measure with a subscale relating to Prospective uncertainty (e.g.: "Unforeseen events upset me greatly") and Inhibitory uncertainty (e.g.: "When it's time to act, uncertainty paralyses me"). Participants rate items related to uncertainty, ambiguous situations and future events on a 5-point Likert-type scale from 1 (not at all characteristic of me) to 5 (entirely characteristic of me). Higher scores indicate a higher level of intolerance of uncertainty. The IUS-12 was shown to be comparable and highly correlated (r = .96, p< .01) to the original long form (Carleton et al., 2007; Khawaja & Yu, 2010). It has good internal consistency, convergent and discriminant validity documented for both total and subscale scores (Carleton et al., 2007; McEvoy & Mahoney, 2011). The total scale score of the IUS-12 (α = .89) was used in the current study.

Socio-demographic questionnaire. A family background questionnaire, containing items regarding demographic information, was completed by mothers at T1 and T2. Information relating to family income, parental education and marital status, child gender and age was included in the questionnaire. At T3, the young adults completed a socio-demographic questionnaire. Information relating to income, education, living situation, and relationship status were included in the questionnaire.

Results

Preliminary analyses

Prior to analysis, normality of data distribution was verified and data were transformed accordingly where necessary. Data were also screened for outliers (Tabachnick & Fidell, 2007). No outliers were found in the sample. All main analyses were conducted with the 60 participants remaining in the study at T3.

Correlations and t-tests were performed with participant age, gender, maternal age, maternal education and family income in order to identify potential socio-demographic covariates related to the dependent variable, i.e. the intolerance of uncertainty scores. No significant associations were found with socio-demographic variables and IU (all $p > .05$), therefore they were not controlled in further analyses.

Behavioural Inhibition

Our first objective was to address the validity of the behavioural inhibition measure. No significant correlations between the BIM score and any of the attachment groups were observed (Table 2, all $p > .05$). ANOVA with attachment treated as a categorical variable (A, B, C, Dcontrol and BehD) revealed similar results. Thus the BIM score was not significantly related to attachment classifications, suggesting it measured a separate concept.

The BIM was then compared to neuroticism and its subscales. Of particular interest for validation purposes was the N4 self-consciousness subscale that is related to shyness and social anxiety. Correlations revealed no significant relationship between BIM and the main neuroticism domain nor its subscales, except for the N4 subscale ($r = .30$, $p = .026$, all other $ps > .05$). Children with higher BIM scores had significantly higher self-consciousness scores (Table 3).

Insert Table 2

Since a large part of the BIM is related to vocalizations, correlation between the BIM and vocabulary competence were performed to ensure that the vocalization coding was not related to child vocabulary. Children's vocabulary competence was not significantly related to the BIM score ($r = -.24$, $p > .05$). Divergent validity of the BIM score with attachment coding and convergent validity with a concept related to shyness and social anxiety validates the use of the BIM score in subsequent analyses.

Insert Table 3

Maternal anxiety

The second objective was to examine the relation of maternal anxiety to both attachment and behavioural inhibition and confirm previous research linking these variables. Insecure children were significantly more likely to have anxious mothers, in fact, no secure child had a mother classified as anxious (Fisher's, p= .011). Furthermore, children classified as disorganized controlling were significantly more likely to have anxious mothers compared with other children, while this effect approached significance in avoidant children (Dcontrol: Fisher's, p= .039; A: Fisher's: p= .052). Anxious mothers had children with significantly higher behavioural inhibition scores than did non-anxious mothers (M = 3.98, *S.D.* = 1.95; M = -0.54, *S.D.* = 2.95, respectively, $t(51)$ = 3.64, p= .001, d = 1.58).

Preschool behavioural inhibition and attachment as predictors of adult intolerance of uncertainty

Prior to main analyses, neuroticism and maternal anxiety were also tested as possible covariates of IU. As anticipated, participants with higher neuroticism scores also had significantly higher IU scores (r = .60, p< .001), therefore neuroticism was controlled for in main analyses. However, participants with anxious mothers (M = 1.40, *S.D.* = .14) did not significantly differ from those with non-anxious mothers (M = 1.48, *S.D.* = .16) in IU ($t(53)$ = 1.19, p= .24, d = .58). Therefore, maternal anxiety was not included in main analyses.

Participants with higher behavioural inhibition scores had significantly higher intolerance of uncertainty scores 15 years later (r= .30, p= .022). Attachment, coded in dummy variables contrasting each group with the reference secure group (B), was also significantly related with intolerance of uncertainty. Specifically, participants with ambivalent and disorganized controlling attachment patterns at preschool age had significantly higher intolerance of uncertainty scores 15 years later (C vs B = r = .32, p = .014; Dcontrol vs B = r= .28, p= .032). Avoidant (A) and behaviourally-disorganized (BehD)

attachment groups were not related to intolerance of uncertainty. Table 2 presents correlation coefficients as well as means and standard deviations for variables included in main analyses.

Given that the N4 self-consciousness subscale of neuroticism was shown to be related to behavioural inhibition, it was removed from the total neuroticism score so that behavioural inhibition and neuroticism could be addressed as separate predictors of intolerance of uncertainty. Therefore a neuroticism score without the N4 scale was computed by summing all other neuroticism subscale scores (Neuroticism-noN4; Table 2). The Neuroticism-noN4 score was used in the following analyses.

A hierarchical regression was performed to examine the independent and interactive contributions of behavioural inhibition and attachment at preschool age to the development of intolerance of uncertainty in adulthood (Table 4). First, in order to ensure that BI and attachment would independently predict intolerance of uncertainty from other potential risk factors for psychopathology, neuroticism was entered as a first step in the prediction model since it was collected at the same time point as our outcome variable. The regression analysis was therefore performed with neuroticism in Step 1 (control variable = Neuroticism-noN4), behavioural inhibition in Step 2 and attachment in Step 3. Insecure-ambivalent (C) (β = .32) and disorganized controlling (Dcontrol) (β = .23) attachment significantly predicted intolerance to uncertainty (explaining 15.4% of the variance), even after controlling for neuroticism (β = .57) and behavioural inhibition (β = .24), which independently explained 33.0% and 6.0% of the variance, respectively. When attachment x behavioural inhibition interaction terms, using a centered transformation of the continuous variable, were added to the model, they failed to reach statistical significance. Furthermore, when the interaction terms were added, the total variance explained of the model dropped from 48.3% to 45.4%, making it a weaker fit. Therefore the better fitted model is one that includes preschool attachment and behavioural inhibition as predictors of intolerance of uncertainty while controlling for neuroticism.

Insert Table 4

Discussion

Insecure attachment and behavioural inhibition in childhood independently predicted intolerance of uncertainty in adulthood 15 years later, while controlling for neuroticism and maternal anxiety. These results are consistent with theoretical models of the development of intolerance to uncertainty and anxiety (Cassidy, 1995; Cassidy et al., 2009; Dugas et al., 2004; Shamir-Essakow et al., 2005; Warren et al., 1997). Furthermore, as predicted, maternal anxiety was related to both increased behavioural inhibition and an increased likelihood of insecure attachment in children. However, maternal anxiety was not significantly correlated with intolerance of uncertainty. Finally, we successfully validated a new observational behavioural inhibition measure, developed for toddlers, to an older population of children. In summary, this study is the first to longitudinally assess the intrinsic and external developmental factors that contribute to the development of an individual's life long intolerance of uncertainty.

Insecure attachment, specifically the insecure ambivalent (C) and the disorganized controlling (Dcontrol) subtypes, predicted intolerance of uncertainty over and above neuroticism, maternal anxiety and child temperament. This finding underscores the importance of early child-caregiver relationships as an influence on intolerance for uncertain and ambiguous situations, supporting previous theoretical and empirical studies describing dysfunctional child-caregiver relationships as possible risk factors for later psychopathology (Cassidy, 1995; Cassidy et al., 2009; Dugas et al., 2004; Shamir-Essakow et al., 2005; Warren et al., 1997). Concordant with our results, Warren et al. (1997) found ambivalent attachment to be a stronger predictor of anxiety disorders in adolescence than maternal anxiety and infant temperament. However, Warren et al. (1997) did not include the D attachment classification and ambivalent children were compared to all other attachment types combined only (i.e.: C versus A and B combined), meaning that a clear comparison of avoidant children was not possible. Brown & Whiteside (2008) showed that ambivalent children reported higher levels of worry compared to secure children, but did not differ from avoidant children. In the current study, we compared avoidant children with other attachment groups, confirming Warren et al.'s (1997) hypothesis that ambivalent not avoidant attachment

would be related to anxiety disorders due to the chronic inconsistent parenting experienced by ambivalent children. Our results suggest that the perceived threat of ambiguity or uncertainty and a lack of control over one's environment (concepts also related to disorganized controlling attachment) may play a crucial role when it comes to intolerance of uncertainty. When children's expectations of their security and the availability of their caregiver are compromised due to inconsistent and fear-evoking caregiver behaviour, it can lead to perceiving any uncertainty as threatening, as well as to chronic worry and potential anxiety disorders.

Disorganized controlling attachment also predicted intolerance of uncertainty above and beyond neuroticism, maternal anxiety and child temperament. Our results are consistent with Tan et al. (2010) who demonstrated, using the role reversal/enmeshment subscale, akin to disorganized controlling attachment, of the Perception of Adult Attachment Questionnaire (PAAQ: Lichtenstein & Cassidy, 1991), that role reversal/enmeshment was positively related to intolerance of uncertainty.

Chorpita and Barlow (1998) suggested that early experience of reduced sense of control over one's environment can increase a child's risk for anxiety disorders. Insecure children, particularly ambivalent children, would have such a sense of lack of control due to inconsistent parenting. Disorganized children who experience helpless or hostile parenting or maltreatment would also experience a sense of lack of control. As they get older, disorganized children would not be able to tolerate this lack of control over their environment, or in this case their parent. In order to cope with this situation, developing a controlling attachment would enable these children to gain some control and reduce uncertainty through role reversal. Our results demonstrated that out of the two disorganized groups in our study, only the controlling type was related to intolerance of uncertainty and not the behaviourally disorganized group. The disorganized children that develop a controlling attachment may have a lower threshold for tolerating uncertainty than those children that remain disorganized at older ages (BehD). Severe marital discord has been documented in the BehD children's families (Moss et al., 2004). BehD children may be habituated to constant chaotic family environments characterized by inconsistent childrearing

practices from both parents associated with severe marital discord. This may explain the difference between BehD and children with controlling attachment. Disorganized controlling children are hypervigilant and must count on their capacity to control those around them to reduce their chances of being frightened, and lack of control is highly stressful and anxiety provoking for them (Moss et al., 2011). However, caution must be used with such an interpretation due to the small numbers in either disorganized controlling and BehD groups in our study. Although differences are documented between disorganized controlling and BehD attachment (Moss et al., 2004), future studies with larger sample sizes should investigate these discrepancies in relation to intolerance of uncertainty. For example, larger sample would allow investigating differences not only between the disorganized controlling and insecure-other attachment, but also examine possible difference between the two types of controlling attachment, which have been previously documented (O'Connor et al., 2011).

Torgenson (1986) found that generalized anxiety disorder patients were more likely to report the death of a parent before the age of 16 than were patients with panic disorder. An unresolved adult attachment (comparable to the disorganized subtype in younger individuals) has been associated with loss (Moss et al., 2004). Current adult attachment state may also be an important variable to include in future studies of intolerance of uncertainty and generalized anxiety. As previously mentioned, Cassidy and colleagues (2009), using the PAAQ (Lichtenstein & Cassidy, 1991), found that adult generalized anxiety disorder patients reported higher childhood 'role reversal/enmeshment' (i.e. disorganized controlling attachment) and 'rejection/neglect' and lower instances of 'being loved' by their parent. However, childhood attachment perceptions no longer differentiated GAD patients from controls once participant's current adulthood attachment to their parent was taken into account. Since results were retrospective, perceptions of current adulthood attachment may have been easier and more accurate to recall, possibly accounting for the stronger relation to GAD compared with childhood attachment. Correlations between perceptions of childhood and adulthood attachment were not reported. Cassidy and colleagues (2009) pointed out that current attachment mental state was important to consider as it can influence anxiety, because even in adulthood a parent, that did not provide secure care when an individual was a child, may still be a source of trouble in adulthood during stressful times. Failure to develop coping

skills and adequate self-regulation as a child and having current unresolved issues with a parent can negatively affect an individual (Cassidy, 1995; Cassidy et al., 2009). One advantage of our observational measure is that it does not rely on recall of childhood attachment by participants and thus may yield less biased results. Furthermore, our sample comes from the general population. In fact, except for Tan and colleagues (2010), the aforementioned studies all examined at risk or clinical populations (Brown & Whiteside, 2008; Cassidy et al., 2009; Warren et al., 1997). Since our participants were not preselected on any criteria, our results should be more representative of the general population.

Levels of behavioural inhibition in childhood also contributed to a low threshold for tolerating uncertain situations or events, above and beyond neuroticism and maternal anxiety. Our results are consistent with research on anxiety. Vreeke & Muris (2012) found that higher levels of behavioural inhibition were related to children's anxiety symptoms after controlling for neuroticism. They found similar results in both a non-clinical sample and clinical sample of anxious children. Further similar to our results, they also found that behavioural inhibition was not directly related to the overall neuroticism score. Therefore, our findings raise the possibility that being behaviourally inhibited early in life can still have an effect on low tolerance for uncertainty in adulthood and this above current psychological vulnerability such as neuroticism. Behavioural inhibition involves heightened reactions to novelty and uncertainty, and these reactions potentially predispose children to learn or develop a view that the environment can be uncertain and dangerous. In this respect inhibited children are similar to children that learn that their caregiver is unavailable or inconsistent and perceive uncertainty as a threat. Avoiding these perceived threatening or frightening situations enables the child to control his anxious reactions to those situations but also maintains them, putting him at risk of developing a cognitive filter such as intolerance of uncertainty and potentially anxiety.

Behavioural inhibition explained less variance in intolerance of uncertainty compared with attachment. One possibility is that behavioural inhibition was measured when children were 6 years of age, when potential environmental or relational influences, such as parenting, could have affected its development. However, attachment was also measured at the same

age, and previous studies have measured behavioural inhibition at similar or older ages throughout a child's development and have yielded temperamental effects on later outcomes (Fox, Henderson, Marshall, Nichols & Ghera, 2005; Kagan, Snidman, Kahn & Townsley, 2007). Furthermore, the children that were found to be inhibited at this later age could represent children that have a more stable behavioural inhibition from an earlier age. Stable behavioural inhibition has been shown to be a stronger prediction of later behavioural problems (Biederman et al., 1993). Indeed, these longitudinal results are impressive considering this was an unselected sample when it came to child temperament, since samples that preselect children on the basis of behavioural inhibition usually yield stronger results (Degnan & Fox, 2007; Reznick et al., 1989).

Behavioural inhibition and attachment did not have interacting effects on intolerance of uncertainty. Our study did not confirm integrative models related to the development of anxiety disorders proposing an increased risk for anxiety in BI children with insecure attachment (Manassis & Bradley, 1994). Our results are consistent with previous studies that found independent effects for both attachment and behavioural inhibition on anxiety (Shamir-Essakow et al., 2005). However, some studies found that attachment and behavioural inhibition had interacting effects on worry or anxiety disorders (Muris et al., 2011). Thus there are inconsistent results regarding interaction effects between behavioural inhibition and attachment on later outcomes. This could be due to the different methodologies used or different populations examined. For example, a recent meta-analysis reported mixed results between studies examining attachment and anxiety disorders, potentially related to methodological issues such as type of attachment measure used, age of participants, type of population (i.e.: clinical or non-clinical) and reported outcome measures (Brumariu & Kerns, 2010). However, another meta-analysis examining attachment and internalizing behaviours (including anxiety disorders) reported that such issues had little effect on internalizing outcomes (Groh et al., 2012), as opposed to externalizing behaviours (Fearon et al., 2010). Regarding behavioural inhibition, type of measure (observational versus parent report), type of population (selected versus unselected sample) and stability of BI have all been identified as having potential effects on outcomes (Kagan & Snidman, 2004; Kagan et al., 2007; Reznick et al., 1989; Chronis-Tuscano, Degnan, Pine, Perez-Edgar, Henderson, Diaz et al.,

2009). Still, much more research must be conducted on BI and attachment in relation to distinct anxiety disorders as well as in clinical and non-clinical samples, before clearly establishing these effects.

In line with previous studies, maternal anxiety was related to attachment insecurity (Manassis et al., 1995). Surprisingly, no child classified as ambivalent had an anxious mother. However, since our sample was taken from the general population, very few mothers reported anxiety symptoms; therefore our score was dichotomized resulting in very few anxious mothers, which may have contributed to the here mentioned results.

Although the BIM is a new measure of behavioural inhibition, our results suggest that it is a valid and reliable measure. As predicted, anxious mothers' children had higher levels of behavioural inhibition, supporting previous results (Biederman et al., 1990, 1993, 1995). Fearful reactions by mothers may help maintain BI in children (Gerull & Rapee, 2002). Furthermore, the fact that our behavioural inhibition measure was not associated with the overall neuroticism score, but only the subscale related to shyness, suggests that the BIM measures a concept more closely related to self-consciousness in public, discomfort around others and uneasiness in awkward social situations rather than overall vulnerability to negative emotions and maladjustment (Costa & McCrae, 1992). Having already been validated in a younger population of children (Chapter 2, this thesis), these results further validate the BIM as a promising observational behavioural inhibition measure. The fact that this measure can be easily implemented in studies with video footage of short free play sessions makes it a valuable observational tool to study temperament. Furthermore, as the vocalizations are measured in terms of syllables, this measure can be used with culturally diverse populations as it is not necessary to understand the language of the participants even in older populations of children (see Appendix A; Chapter 2, this thesis). Since the BIM is based on coded behaviours in free play sessions ranging from 2 to 5 minutes involving the mother and child, it can be implemented in any of the many studies which have this type of video footage. The children can range from 18 months to 7 years of age, making the BIM quite adaptable. The BIM can be easily added to existing studies that have already collected data if they have the appropriate video footage. Finally, the main advantage of the BIM is

that it does not overburden participants, it can be as easily added to new prospective research projects as well as already existing ones, and is much shorter than existing observational BI paradigms. It seems that the novelty of the room and toys suffices to distinguish children on behavioural inhibition. However, further validation in different at risk, clinical or culturally diverse and larger samples would be important to establish its generalizability across populations.

Although our results are promising, there are some limitations to address. The young adulthood data (intolerance of uncertainty and neuroticism) were taken at the same time point and were self-reports. The use of self-report questionnaires could have overstated the relationship between these variables due to shared method variance. However, as some childhood measures were related to intolerance of uncertainty and not neuroticism and vice versa, shared variance cannot fully account for our findings. Using multiple sources for the data, such as self, parental, and peer-reports, and using composite scores instead of single measures could have strengthened the results. Replication in other populations would of course be valuable, and a larger sample would also be beneficial, enabling the study of different anxiety disorders with sufficient statistical power. Furthermore, behavioural inhibition and attachment were measured at the same time point of the study, and video footage from the same laboratory session was used to code both measures, also possibly creating shared method variance. However, distinct parts of the sessions were used for each measure and no relation was found between the two variables, making shared variance also improbable in this case.

In the current study the influence of child internalizing problems was not ruled out. However, in a previous study on the current sample examining the role of preschool attachment and self-reported childhood internalizing symptoms (at age 11) on the development of intolerance of uncertainty, after controlling for neuroticism, internalizing problems did not significantly contribute to the model, but were highly related to neuroticism (Zdebik, Brassard, Lalande-Markon & Moss, 2009). This study demonstrates that having a distal measure of psychopathology may be redundant if a proximal one is available. However, future studies should control for child psychopathology if they do not have a more

proximal psychopathology measure such as neuroticism. In addition, controlling for other maternal characteristics, for example maternal personality and parenting style, would be important as these have been shown to moderate the relationship between child temperament and later social adjustment (Coplan, Arbeau & Armer, 2008). And although maternal anxiety was not associated with intolerance of uncertainty, it is important to consider that the well-being of both parents can affect a child's vulnerability to certain disorders (Bögels, Stevens & Majdandžić, 2011; Verhoeven, Bögels & Van der Bruggen, 2012). Paternal psychological measures would be important to consider in future studies.

A notable line of investigation was suggested by Dugas and colleagues (2004). Due to the stable character of intolerance of uncertainty, it was proposed that it may act as a 'cognitive diathesis' increasing an individual's chances of developing anxiety in reaction to increased stress. A next step would be to investigate if individuals experiencing more IU are at increased risk of developing generalized anxiety disorder and if this link is moderated by the amount of stress they have experienced throughout their life. Investigating the factors than make some individuals resilient and others susceptible to stressors would also be a vital next step. Sroufe and colleagues (1990) also described the enduring influence of early attachment patterns and how they can resurge under certain circumstances, particularly in stressful situations, throughout an individual's life. It is possible that early integrated experience, shaped by both attachment and temperament, can resurface in times of stress, such as in late adolescence and early adulthood, a period synonymous with increased responsibilities compared to childhood. Clinical studies examining the effects of attachment or BI interventions could also be used to establish how intolerance of uncertainty develops.

In summary, our study is the first to empirically show that preschool attachment, particularly ambivalent and disorganized controlling, as well as behavioural inhibition independently predict intolerance to uncertainty in adulthood, after controlling for neuroticism and maternal anxiety. Furthermore, the use of a new behavioural inhibition measure (the BIM) based on an existing paradigm appears promising. It can be coded from existing studies with appropriate video footage, enabling the addition of valuable childhood temperament information, thus expanding the possibilities of analysis with previously well-

studied cohorts and providing substantial advantages over retrospective questionnaires. Finally, our study emphasizes the role of early cognitive processes in the development of later psychopathology. As Cassidy (1995) so eloquently put it when speaking of the importance of cognitive processes in attachment theory: '...they are thought to play an important role in the links between early experience and later developmental outcome'. Our study emphasizes the role of these early cognitive processes related to perceived insecurity and uncertainty on a temperamental and relational level in the development of the later cognitive schema of intolerance to uncertainty, hence proposing new opportunities for preventative treatment not only with young children but also with their caregivers.

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Table 1

Attachment classifications at the three time points.

	Attachment				
	B	A	C	Dcont	BehD
Time 1	61% (42 girls, 35 boys)	16% (10 girls, 11 boys)	9% (6 girls, 5 boys)	10% (6 girls, 7 boys)	4% (5 girls, 0 boys)
Time 2	57% (26 girls, 19 boys)	16% (8 girls, 5 boys)	9% (4 girls, 3 boys)	13% (5 girls and 5 boys)	5% (4 girls, 0 boys)
Time 3	59% (24 women, 11 men)	19% (8 women, 3 men)	10% (2 women, 4 men)	7% (1 woman, 3 men)	5% (3 women, 0 men)

B = secure; A = avoidant; C = ambivalent; Dcont = disorganized controlling; BehD = behaviourally disorganized

Table 2

Correlations and descriptive statistics between main analyses variables (N=56). Abbreviations are given in column 1.

Variables			B	A	C	Dcont	BehD	BIM	noN4	IU
Attachment										
	Secure	(B vs. other) [a]	—							
	Avoidant	(A vs. other) [a]	-.58**	—						
	Ambivalent	(C vs. other) [a]	-.39**	-.15	—					
	Disorganized controlling	(Dcont vs. other) [a]	-.35**	-.13	-.09	—				
	Behaviourally disorganized	(BehD vs. other) [a]	-.30*	-.11	-.07	-.07	—			
Behavioural inhibition (BIM)		(BIM)	-.15	.13	.06	.05	-.02	—		
Neuroticism (noN4)		(NEO-PI-R) [b]	-.10	.09	.005	.11	-.07	.11	—	
Intolerance of uncertainty (IU)		(IUS-12) [c]	-.26	-.03	.33*	.28*	-.12	.30*	.57**	—
M								.00	95.14	27.11
SD								3.17	20.06	8.94
Range								-7.15-6.36	30-130	13-53

[a]Attachment coded in dummy variables.

[b]Total neuroticism score without N4 subscale.

[c]Partial correlations controlling for neuroticism score without N4 subscale.

* $p < .05$, ** $p < .01$

Table 3

Correlations and descriptive statistics between the Behavioural Inhibition Measure and the neuroticism domain and subscales (N=57)

Variables	BIM	N1	N2	N3	N4	N5	N6	N	noN4
Behavioural inhibition (BIM)	—								
N1 Anxiety (level of fear, worry and nervousness) [a]	.24	—							
N2 Angry hostility (level of anger, frustration and bitterness) [a]	.03	.66**	—						
N3 Depression (tendency to experience depressive affect) [a]	.19	.71**	.62**	—					
N4 Self-Consciousness (shyness and social anxiety) [a]	.30*	.63**	.38**	.69**	—				
N5 Impulsiveness (inability to control cravings or urges) [a]	-.02	.36**	.44**	.25	.22	—			
N6 Vulnerability (inability to cope with stress) [a]	-.04	.66*	.55**	.72**	.62**	.39**	—		
Neuroticism (N) (proneness to psychological distress)	.16	.87**	.77**	.86**	.76**	.55**	.85**	—	
Neuroticism no N4 (noN4)[b]	.12	.87**	.81**	.85**	.66**	.59**	.84**	.99**	—
M	.00	17.63	14.85	16.60	16.23	18.13	12.30	95.70	79.42
SD	3.25	5.74	4.18	5.30	4.35	4.22	5.00	22.47	19.44
Range	-7.15-6.36	5-31	4-23	3-28	7-26	6-30	0-25	37-155	30-130

[a]N1 through N6 are neuroticism subscales with description. [b]Total neuroticism score without N4 subscale. * $p < .05$, ** $p < .01$

Table 4

Hierarchical regression model with preschool attachment and behavioural inhibition as predictors of adult intolerance of uncertainty (N=56)

Predictor variables		ΔR^2	ΔF	(df)	ß
Intolerance to Uncertainty (IUS-12)					
Step 1		.33	26.48**	(1,54)	
Neuroticism - no N4 scales (NEO PI-R)					.57**
Step 2		.06	4.85*	(1,53)	
Behavioural inhibition (BIM)					.24*
Step 3		.15	4.11**	(4,49)	
Attachment					
Avoidant	(A vs. B) [a]				-.03
Ambivalent	(C vs. B) [a]				.32**
Disorganized controlling	(Dcont vs. B) [a]				.23*
Behaviourally disorganized	(BehD vs. B) [a]				-.04
Step 4		.01	.33	(4,45)	
Behavioural inhibition x Attachment					
BI[b] x Avoidant	(A vs. B) [a]				-.04
BI[b] x Ambivalent	(C vs. B) [a]				.10
BI[b] x Disorganized controlling	(Dcont vs. B) [a]				.01
BI[b] x Behaviourally disorganized	(BehD vs. B) [a]				.73

[a]Attachment coded in dummy variables contrasting each group with the reference group (secure; B).

[b]BI refers to behavioural inhibition as measured by the behavioural inhibition measure (BIM)

* $p < .05$, ** $p < .01$

CHAPTER IV

GENERAL DISCUSSION

This thesis examined the role of behavioural inhibition and attachment on the development of psychopathology using a new observational measure of behavioural inhibition ('BIM'). It provides the first empirical longitudinal confirmation of a link between development of intolerance of uncertainty (IU) in adulthood and specific attachment patterns and temperamental traits in childhood. Study 1 revealed that the BIM was (1) independent of attachment, (2) congruent with validated temperament questionnaires, and (3) congruent with an existing well-validated observational behavioural inhibition procedure from a well-established child temperament laboratory (Fox et al., 2011; White et al., 2011). Furthermore, the BIM was (4) able to differentially predict behaviour problems in toddlers compared with attachment, however, (5) attachment and behavioural inhibition had no interacting effect on behavioural problems. Also using the BIM, Study 2 revealed (1) a link between both childhood behavioural inhibition and ambivalent and disorganized controlling attachment patterns to the cognitive concept of intolerance of uncertainty in adulthood, and this finding remained after controlling for maternal anxiety and neuroticism. Moreover, (2) attachment and behavioural inhibition had no interacting effect on the development of intolerance of uncertainty. Taken together, our results confirm that increased behavioural inhibition and insecure attachment can independently contribute, even over a 15 year span, to the risk of later psychopathology. Furthermore, we obtained strong support for the BIM as a valid behavioural inhibition measure.

Main findings Study 1(Chapter 2)

The principal finding of Study 1 was that the BIM measure differentially predicted child behaviour problems compared to the Strange Situation procedure (SSP). Specifically, the BIM concurrently predicted child internalizing behavioural problems but was not significantly related to externalizing problems. Conversely, attachment classification was related to externalizing behavioural problems, but was not significantly related to internalizing behavioural problems.

Results relating to the BIM were consistent with previous studies showing that behaviourally inhibited children, were at increased risk of developing internalizing problems such as social withdrawal, anxiety and depression (Albano, Chorpita & Barlow, 2003; Biederman, Rosenbaum, Hirshfeld, Faraone, Bolduc, Gersten et al., 1990; Biederman, Rosenbaum, Bolduc-Murphy, Faraone, Chaloff, Hirshfeld et al., 1993; Biederman, Rosenbaum, Chaloff & Kagan, 1995; Rosenbaum, Biederman, Hirshfeld, Bolduc, Faraone, Kagan et al., 1991). However, we did not confirm reports that uninhibited children were at increased risk for externalizing behaviours such as aggression and oppositional defiant disorder (Biederman et al., 1990; Burgess, Marshall, Rubin, & Fox, 2003; Schwartz, Snidman, & Kagan, 1996). A possible explanation is that we examined a natural range of behavioural inhibition, rather than extreme groups. Associations between inhibition and measurements of temperament, behavioural problems and psychological disorders have been strongest when extremely inhibited or uninhibited groups were included (Degnan & Fox, 2007; Reznick, Gibbons, Johnston & McDonough, 1989).

Our attachment classification was also used as a continuous score with a low score indicating secure attachment, a medium score indicating insecure attachment and high scores indicating disorganized attachment. Our results were consistent with previous work demonstrating that insecure children are at increased risk for behavioural problems compared with children classified secure (Burgess et al., 2003; Weinfield, Sroufe, Egeland, & Carlson, 1999) and that children with a disorganized attachment are most at risk for behavioural problems, particularly externalizing problems, compared with all other attachment types (Carlson, 1998; Fearon, Bakermans-Kranenburg, van IJzendoorn, Lapsley & Roisman, 2010;

Groh, Roisman, van IJzendoorn, Bakermans-Kranenburg & Fearon, 2012; Lyons-Ruth, Alpern, & Repacholi, 1993; Lyons-Ruth, Easterbrooks & Cibelli, 1997; Moss, Smolla, Cyr, Dubois-Comtois, Mazzarello & Berthiaume, 2006). As demonstrated in Study 1, the continuous attachment score revealed a significant linear relationship from secure to insecure to disorganized. Therefore, our results could reflect those seen in Bureau & Moss (2010), where disorganized children were more likely to display externalizing problems compared with secure and avoidant children, but did not significantly differ from ambivalent children. In addition, recent meta-analyses also showed that disorganized attachment was more strongly related to externalizing than internalizing behaviour problems (Groh et al., 2012).

Main findings Study 2 (Chapter 3)

Study 2 revealed that attachment and behavioural inhibition in childhood independently predicted a low threshold for tolerating uncertain situations in adulthood 15 years later. Specifically, insecure ambivalent (C) and disorganized controlling (Dcontrol) attachment subtypes predicted intolerance of uncertainty above and beyond neuroticism, maternal anxiety and behavioural inhibition. These findings highlight the importance of early child-caregiver relationships as an influence on intolerance for uncertain and ambiguous situations and support previous theoretical and empirical studies identifying dysfunctional child-caregiver relationships as risk factors for later psychopathology (Cassidy, 1995; Cassidy, Lichtenstein-Phelps, Sibrava, Thomas & Borkovec, 2009; Dugas, Buhr & Ladouceur, 2004; Shamir-Essakow, Ungere & Rapee, 2005; Warren, Huston, Egeland & Sroufe, 1997).

In line with our results, Warren et al. (1997) found that ambivalent attachment was a stronger predictor of anxiety disorders in adolescence than maternal anxiety and infant temperament. However, attachment disorganization was not assessed in this study. Brown & Whiteside (2008) also demonstrated that ambivalent children reported higher levels of worry compared to secure children, but they did not find that ambivalent children differed in worry from avoidant children. Furthermore, Tan and colleagues (2010) demonstrated that perceived disorganized controlling attachment was positively related to intolerance of uncertainty, but did not investigate other types of attachment. Our results took into account disorganized

attachment and also compared avoidant children with other attachment groups. Our results suggest that the perceived threat of uncertainty and a lack of control over one's environment may play a crucial role in the development of intolerance of uncertainty. When children's expectations of their security and the availability of their caregiver are compromised due to inconsistent and fear-evoking behaviour on the caregiver's part, this can lead the child to perceive any uncertainty as threatening, and lead to chronic worry and potential anxiety disorders (Cassidy, 1995; Thompson, 2001). Furthermore, dysfunctional early child-caregiver relationships can compromise adequate development of coping skills and self-regulation which can negatively affect a child throughout their development into adulthood (Cassidy, 1995; Cassidy et al., 2009; Thompson, 2001).

Behavioural inhibition, as measured by the BIM, also contributed to the development of intolerance of uncertainty, even after controlling for neuroticism and maternal anxiety. Our results are consistent with the literature relating behavioural inhibition to the development of anxiety (Degnan & Fox, 2007; Kagan, Snidman, Kahn & Towsley, 2007; Muris, van Brakel, Arntz & Schouten, 2011; Shamir-Essakow et al., 2005). For example, Vreeke & Muris (2012) showed that higher levels of behavioural inhibition were related to increased anxiety symptoms in children, after controlling for the child's neuroticism, and that both behavioural inhibition and neuroticism independently contributed to the child's anxiety symptoms. These results were found in both a clinical and a non-clinical sample of anxious children; however, results were all based on maternal report questionnaires of children's behaviours. Further, congruent with our results, Vreeke & Muris (2012) found that behavioural inhibition was not directly related to the overall neuroticism score.

In sum, our findings corroborate that behavioural inhibition early in life can effect one's capacity to tolerate uncertainty into adulthood, over and above one's current psychological vulnerability. It is possible that the heightened reactions to novelty and uncertainty involved in behavioural inhibition predispose children to view their environment as uncertain and dangerous. Similarly, insecurely attached children that learn that their caregiver is unavailable, inconsistent or frightening, also learn to perceive uncertainty as a threat. Avoiding situations that are perceived as threatening or frightening enables these

children to control and cope with their anxious reactions but, in doing so, it also maintains them, therefore, putting these children at risk for developing a cognitive filter such as intolerance of uncertainty and potential anxiety disorders.

Overall results

Development of the BIM. An overall objective of the thesis, examined in both Study 1 and 2, was to develop and validate a new observational behavioural inhibition measure (the BIM) based on the Strange Situation procedure that could readily and cost-effectively be added to existing studies. In Study 1, we were able to validate our new measure several ways. First, although it was based on video footage of the SSP, the BIM was independent of attachment, supporting previous research stating that temperament is independent of attachment classification (Carlson, 1998; Manassis, Hudson, Webb & Albano, 2001; Vaughn, Bost & van Ijzendoorn, 2008). Further evidence for divergent validity was that our final BIM score was based on behaviours observed in Episode 2 of the SSP which is related to the initial few minutes when the child is alone with the mother prior to the entrance of the stranger and prior to any reunion episodes (i.e.: Episodes 5 and 8) on which attachment classification is primarily based.

Second, the BIM was associated with maternal reports of child temperament questionnaire subscales empirically linked to behavioural inhibition, such that the BIM positively correlated with Fear and Shyness subscales (Shyness approaching significance) and negatively correlated with Approach and Sociability subscales of the IBQ and ECBQ, respectively (Calkins & Fox, 1992; Calkins, Fox & Marshall, 1996; Fox, Henderson, Rubin, Calkins & Schmidt, 2001; Garcia-Coll, Kagan & Reznick, 1984; Pfeifer, Goldsmith, Davidson & Rickman, 2002; Putnam & Stifter, 2002). Our results were similar to those using conventional laboratory-based behavioural inhibition paradigms (Burgess et al., 2003; Calkins et al., 1996; Garcia-Coll et al., 1984; Fox et al., 2001; Kagan, Reznick & Snidman, 1987; Pfeifer et al., 2002). Moreover, the BIM was positively related with shyness and sociability behaviours reported by research assistants having observed the children in a home-setting which corroborated the maternal temperament reports.

Third, further validation was provided by the fact that BIM scores strongly corresponded with an existing 'conventional' laboratory-based behavioural inhibition paradigm from another laboratory. In addition, in Chapter 3, (1) adapting the BIM to an older sample of children (approximately 6 years of age) contributed to generalizing the BIM and (2) linking it to a personality subscale related to shyness and self-consciousness measured 15 years later, further supported the BIM's convergent validity. Finally, supporting previous results, anxious mothers' children had higher levels of behavioural inhibition as measured by the BIM (Biederman et al., 1990, 1993, 1995; Manassis, Bradley, Goldberg, Hood & Swinson, 1995).

Therefore, the BIM was validated in three different cohorts: in the initial 18 month-old cohort (Study 1), in a sample of 24 month-old children from another laboratory (Study 1) and with its adaptation to an older sample of 6 year-old children (Study 2). Although the BIM contrasts with lengthier more elaborate laboratory-based methods assessing behavioural inhibition in young children (Burgess et al., 2003; Calkins & Fox, 1992; Calkins et al., 1996; Garcia-Coll et al., 1984; Fox et al., 2001; Kagan, 1989; Pfeifer et al., 2002; Reznick et al., 1989; Schwartz, Snidman & Kagan, 1999; Shamir-Essakow, Ungerer & Safier, 2004), these overall results revealed that the BIM may be an economical method for identifying inhibited and non-inhibited children. It is possible that the only novelty and uncertainty needed to elicit differences between inhibited and noninhibited children is an unfamiliar room and toys (i.e.: a novel environment to explore) even in the presence of the mother. Although measured in three different cohorts, it would be important to test the BIM in different populations, such as clinical populations.

Furthermore, our results showed that it was possible to create a continuous behavioural inhibition measure. Reznick and colleagues (1989) also measured behavioural inhibition continuously in a normative sample, yielding similar results to cohorts where children were preselected on behavioural inhibition markers. Their results confirmed that behavioural inhibition could be measured on a continuous scale, as their behavioural inhibition measure was normally distributed, showing no abrupt difference of distribution of behaviours at the extremes (Reznick et al., 1989). Therefore, it seems possible to measure

behavioural inhibition in a general population on a continuous measure, hence permitting increased power in statistical analyses.

Examining behavioural inhibition and attachment interaction effect. Another important point investigated in this thesis was the possible interaction between behavioural inhibition and attachment on the risk of psychopathology. Study 1 and 2 revealed consistent results, with no interaction effects between behavioural inhibition and attachment, regardless of whether attachment was viewed as a continuous variable (Study 1) or when the subtypes of attachment were investigated (Study 2).

Similarly, several recent studies did not find interaction effects of behavioural inhibition and attachment on concurrent and later outcomes (for example, Shamir-Essakow et al., 2005). However, it is still unclear if such results necessitate reconsideration of integrative models of the development of child psychopathology, such as anxiety disorders, which proposed both independent and interactive effects of behavioural inhibition and attachment (Manassis & Bradley, 1994; Vasey & Dadds, 2001). As our results showed that behavioural inhibition and attachment did not have interacting effects on internalizing and externalizing behavioural problems, nor on intolerance of uncertainty, they were similar for example to those of Shamir-Essakow and colleagues (2005), who found independent and non-interacting effects for both variables on childhood anxiety. However, as in our case, these researchers stated that the lack of finding an interaction effect may be due to the small sample size of their study (Shamir-Essakow et al., 2005). Attachment and behavioural inhibition have been shown to have interacting effects on for example worry, anxiety disorders and externalizing behavioural problems (Burgess et al., 2003; Muris et al., 2011). Thus larger samples would be necessary to elucidate the independent and combined effects of attachment and behavioural inhibition on child development. Furthermore, methodological issues must also be considered, as studies used varied measures of attachment and behavioural inhibition, examined different outcome variables and studied various populations (e.g.: clinical or non-clinical), all which may have impacted the interpretation of results. For example, it is possible that interaction effects can be found in some populations and not others. Future studies should take these differences into account.

Limitations and future research directions

Even though the overall results of this thesis are noteworthy, some important limitations must be noted. First, both studies measured behavioural inhibition and attachment at the same time point and, particularly in Study 1, the BIM was based on video footage that was also used to code attachment. Although the main reason for creating the BIM to be coded from the Strange Situation procedure, and hence its main advantage, was so that it can be standardized and easily added to existing studies, issues related to shared methods variance must be discussed. Attachment classification is mainly based on reunion episodes (Episodes 5 and 8) of the Strange Situation (Ainsworth, Blehar, Waters & Wall, 1978), however, in Study 1 the BIM was based on Episode 2, which far precedes reunion episodes. In Study 2, coding of the BIM also preceded video footage used to classify attachment. Although in both cases shared variance would have been expected to result in correlation between attachment and BIM scores, this was not observed. Moreover, as discussed previously, the BIM was related to expected temperamental constructs and BIM scores and attachment classification differently predicted child behavioural problems. Taken together, these results show that the BIM, even if measured from the same paradigm as attachment, measures a different construct to attachment. This is supported by research stating that child temperament and attachment are independent and should be regarded as orthogonal concepts (Sroufe, 1985; Vaughn, et al., 2008).

Second, both Study 1 and 2 had small sample sizes. While both studies yielded results with moderate to strong effect sizes, showing that early childhood individual and dyadic characteristics play an important role in current and future development and adaptation, increased sample sizes would help confirm these results. Furthermore, examining these samples at later time points, using methods such as multiple imputation to counter high attrition rates could ameliorate future data analysis. Indeed, future studies investigating attachment and behavioural inhibition observationally and longitudinally could benefit from planned missing data designs to increase cost-effectiveness and reduce overburdening participants and dropout rates (Graham, Taylor, Olchowski & Cumsille, 2006).

Third, both studies were correlational. Repeatedly measuring behavioural inhibition and attachment at different time points could reveal how one influences the other. Furthermore, longitudinal clinical studies could be conducted to assess the effects of interventions aimed at increasing child-caregiver attachment security (Cardinal, Zdebik, Moss, Bernier, Tarabulsy & St-Laurent, 2008; Moss, Dubois-Comtois, Cyr, Tarabulsy, St-Laurent & Bernier, 2011; Tarabulsy, St-Laurent, Cyr, Pascuzzo, Moss, Bernier et al., 2008) or aimed at diminishing extreme levels of behavioural inhibition (Kennedy, Rapee & Edwards, 2009) on individuals levels of intolerance to uncertainty. Such studies would allow causal relationships to be established.

Fourth, while having controlled for maternal characteristics, such as maternal anxiety in Study 2, other variables such as maternal personality, pre and postnatal stress, parenting style and paternal well-being have also been shown to influence a child's development and vulnerability to certain disorders (Bögels, Stevens & Majdandžić, 2011; Coplan, Arbeau & Armer, 2008; Dawson, Ashman, Hessl, Spieker, Frey, Panagiotides et al., 2001; Dawson, Ashman, Panagiotides, Hessl, Self, Yamada et al., 2003; Meaney, 2007; Verhoeven, Bögels & Van der Bruggen, 2012). Such measures would be important to consider in future studies. Since attachment and temperament are enduring characteristics, it would also be relevant to consider more transient risk factors or specific developmental milestones that can differentially affect child development into adulthood, such as traumatic events that either directly impact the child or that impact the parent-child relationship via an effect on the parent (Vasey & Dadds, 2001). Identifying children at extremes of BI and/or insecure attachment who do not develop later disorders would help detect important protective and transient risk factors. As our sample was not preselected for behavioural inhibition, it would be interesting to, for example, examine if the children who scored at the extremes of the BIM would be at increased risk for later psychopathology compared to children who scored in the middle range.

Finally, although less time consuming for both researcher and participant and more cost-effective than conventional laboratory-based measures of behavioural inhibition, the BIM still takes longer to code than parent or self-report questionnaires and requires proper

training. Despite the BIM's advantages over questionnaires it would be important to compared the performance of the BIM to questionnaires such as the Behavioural Inhibition Questionnaire (BIQ; Bishop, Spence & McDonald, 2003), the Behavioral Inhibition Scale (BIS; Muris, Merckelbach, Wessel & van de Ven, 1999; van Brakel & Muris, 2006; van Brakel, Muris & Bögels, 2004) and to observational questionnaires such as the Non-Caregiver observational temperament questionnaire (N-COTA; Chapter 2, Study 1) on longitudinal prediction of psychopathology. Moreover, further validation of the BIM could be done not only with physiological measures associated with behavioural inhibition (for example, heart rate, cortisol or brain imaging) but also with genetic polymorphisms (for example, short variants in the promoter region genes for the serotonin transporter molecule 5-HTTLPR) related to inhibited and uninhibited behaviours (Fox, Nichols, Henderson, Rubin, Schmidt, Hamer et al., 2005; Kagan et al., 2007).

Contributions to the literature

The findings of this thesis contribute to the existing literature on behavioural inhibition and attachment in several ways. The results underline the importance and the long lasting effects of early child-caregiver relationships and temperament on later socio-emotional adaptation and potential development of psychopathology. Specifically, this thesis demonstrated that attachment and temperament are fundamentally different constructs as they are not related and can independently and differentially contribute to the predictions of behavioural problems and maladaptive cognitive schemas. These findings add to the growing research demonstrating that attachment and child temperament are orthogonal developmental concepts that can however contribute to common developmental outcomes (Vaughn et al., 2008).

Furthermore, this thesis was the first to specifically investigate the theoretical precursors to intolerance of uncertainty with a longitudinal approach. Our findings help explain how children's cognitive representations of (1) a caregiver's availability or of (2) their perception of the environment through their physiological reactions can promote the development of a low tolerance for uncertain and ambiguous circumstances. Our results are likely to be robust as we also controlled for factors such as maternal anxiety and participant's

current neuroticism levels. These findings confirm theory suggesting that insecure attachment, particularly ambivalent and disorganized controlling subtypes, would be the best candidates for contributing to the development of intolerance of uncertainty (Cassidy, 1995; Dugas et al., 2004). Furthermore, our results contribute to the theoretical definition of behavioural inhibition as a vulnerability to uncertainty (Kagan & Snidman, 2004; Reznick et al., 1989). An important advantage of our approach was that we examined and compared specific attachment subtypes (i.e.: secure, avoidant, ambivalent, disorganized controlling and behaviourally disorganized types) and did not solely focus on one attachment classification as previous studies did (Tan et al., 2010; Warren et al., 1997). This permitted us to specifically identify insecure ambivalent and disorganized controlling attachment types as contributors to intolerance of uncertainty. Finally, through the use of observational measures and a longitudinal design, this thesis expanded on research that used self-reports of past and current attachment to, for example, link childhood attachment and adulthood generalized anxiety disorder (Cassidy et al., 2009). Our findings therefore support the theoretical models proposing that ambivalent and disorganized controlling attachment through their internalized representations of the caregiver as unavailable, inconsistent, frightening and worry-provoking, hinder adequate development of coping skills and self-regulation and increase therefore the child's risk to develop later psychopathology (Cassidy, 1995; Dugas et al., 2004).

Therefore, this thesis highlights the importance of consistent and sensitive caregiving behaviours that allow a child to feel safe and secure and the importance of helping a child develop a sense of control and adequate emotional regulation skills. Our findings also underline the importance of awareness of a child's temperament. Therefore, our data suggest two areas that can be independently targeted by therapeutic intervention: the child-caregiver relationship and the child's temperament. Promising interventions have been developed, aimed not only at the individual child, but at promoting parenting skills and augmenting parental well-being (Cardinal et al., 2009; Kennedy et al., 2009). For example, short interventions involving only parents, aimed at diminishing parental anxiety and increasing parenting skills to reduce overprotective parenting, helped reduce not only the child's anxiety levels but also the child's behavioural inhibition levels (Kennedy et al., 2009). Furthermore,

researchers have shown that reducing overprotective behaviours and exposing a highly inhibited child to novel situations in a sensitive way can help diminish their levels of anxiety (Mount, Crockenberg, Bárrig Jó & Wagar, 2010).

Finally, and perhaps most importantly, this thesis contributed a new observational measure of behavioural inhibition: the BIM. Our findings showed that it is possible to measure temperament from an attachment paradigm in a valid way, and therefore contribute a valuable new observational temperament measure to not only the field of behavioural inhibition, but also to attachment research. This measure will particularly allow to retrospectively add observational temperament data to existing cohorts with video footage. For example, studies that employed the Strange Situation could have benefitted from using the BIM rather than solely maternal questionnaires to measure behavioural inhibition, thus allowing comparison of observational and maternal reports (Scheiche & Spangler, 2005). Indeed it must be stressed that the BIM can not only be added to studies with Strange Situation procedures, but to studies with any video footage of mother-child free play sessions. Furthermore, the use of the BIM will enable to simultaneously examine the effect of attachment and behavioural inhibition on later outcomes and to further investigate the potential attachment and behavioural inhibition interaction effects, and investigate integrative models of developmental childhood psychopathology, particularly anxiety disorders (Manassis & Bradley, 1994; Vasey & Dadds, 2001) to try to elucidate the inconsistencies in this line of research.

CONCLUSION

Results from this thesis demonstrate that the BIM is a valuable observational tool to study child temperament, which can not only be easily incorporated into existing studies with video data but also provides considerable advantages over retrospective or parent reported questionnaires. This thesis underlines that importance of both early childhood individual characteristics such as temperament and relational characteristics such as attachment on the development of psychopathology and underscores the need for both individual and family based early interventions. Although temperament and attachment are fundamentally different

developmental constructs, they contribute to common developmental outcomes, sometimes independently and sometimes interactively, therefore, future studies should try to incorporate both when studying child development (Vaughn et al., 2008). The BIM facilitates such research.

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APPENDIX A

BEHAVIOURAL INHIBITION MEASURE (BIM): CODED BEHAVIOURS

A.1

Table A1

Table A1

Coded behaviour patterns, with corresponding Strange Situation Procedure episodes, used in the creation of the Behavioural Inhibition Measure (BIM; Zdebik, 2006).

Coded Behaviour	Definition	Corresponding SSP Episode(s)
Toy in Hand[a]	Child is touching one of the displayed toys.	1
Within 50 cm of Mother[a]	Child is within 50 cm of the Mother.	1
Spontaneous vocalization[b]	Vocalizations refer ot each sound the child makes without being prompted or in response to Mother or Stranger. Does not include negative affect.	2, 3A, 3B, 3C, 4, 5, 6, 7, 8
Vocalizations to Mother[b]	Vocalizations the child makes directed towards the Mother. Child's gaze is oriented towards the Mother during the vocalization.	2, 3A, 3B, 3C, 5, 8
Vocalizations to Stranger[b]	Vocalizations the child makes directed towards the Stranger. Child's gaze is oriented towards the Stranger during the vocalization.	3A, 3B, 3C, 4, 5, 7, 8
Negative Affect[b]	Any negative vocalizations such as a fret, sob or cry.	2, 3A, 3B, 3C, 4, 5, 6, 7, 8
Play[c]	Time spent touching a toy or object (e.g. a magazine) in which the child's attention is focussed on the object as demonstrated by the direction of the child's gaze. Play can also involve such behaviours as the child jumping playfully, singing or playing with his or her reflection. Includes both play with toy and play with stranger.	2, 3A, 3B, 3C, 4, 5, 6, 7, 8
Play with toy[c]	Time spent touching a toy attentively as demonstrated by the direction of the child's gaze. Only play with the displayed toys in the room count as "play with toy". Does not include play with other objects.	2, 3A, 3B, 3C, 4, 5, 6, 7, 8
Play with Stranger[c]	Time spent playing with a toy or other object attentively with the involvement of the Stranger. The Stranger must be interacting (talking and touching the toy or object) in the play.	3A, 3B, 3C, 4, 7
Proximity to Mother 0 to 1 m[c]	Child is within 1 m of the Mother. Use the chair as a point of reference if the Mother is sitting or the Mother's feet if she is walking or standing.	2, 3A, 3B, 3C, 4, 5, 6, 8
Proximity to Mother 1 to 2 m[c]	Child is 1 m away from the Mother but within 2 m of her. Use the chair as a point of reference if the Mother is sitting or the Mother's feet if she is walking or standing.	2, 3A, 3B, 3C, 4, 5, 6, 8
Proximity to Mother 2 m or more[c]	Child is more than 2 m away from the Mother. Use the chair as a point of reference if the Mother is sitting or the Mother's feet if she is walking or standing.	2, 3A, 3B, 3C, 4, 5, 6, 8
Proximity to Stranger 0 to 1 m[c]	Child is within 1 m of the Stranger. Use the chair as a point of reference if the Stranger is sitting or the Stranger's feet if she is walking or standing.	3C, 4, 5, 7, 8
Proximity to Stranger 1 to 2 m[c]	Child is 1 m away from the Stranger but within 2 m of her. Use the chair as a point of reference if the Stranger is sitting or the Stranger's feet if she is walking or standing.	3C, 4, 5, 7, 8
Proximity to Stranger 2 m or more[c]	Child is more than 2 m away from the Stranger. Use the chair as a point of reference if the Stranger is sitting or the Stranger's feet if she is walking or standing.	3C, 4, 5, 7, 8
Proximity to Door 0 to 1 m[c]	Child is within 1 m of the Door.	4, 6, 7
Proximity to Door 1 to 2 m[c]	Child is 1 m away from the Door but within 2 m of it.	4, 6, 7
Proximity to Door 2 m or more[c]	Child is over 2 m away from the Door.	4, 6, 7

Interruption of Ongoing Behaviour[c]	When child stops whatever he/she is engaged in (e.g. play, running, vocalizing, etc.) due to an Interruption Event: Stranger coming in the room (Episode 3A, 7), Stranger talking (Episode 3B), Stranger interacting with child (Episode 3C), Mother leaving the room (Episode 4, 6), Mother entering the room or Stranger leaving (Episode 5, 8). If it takes more then 10 sec. from the time the Interruption Event occurred, no Interruption of Ongoing Behaviour is recorded, nor is it recorded if the child is crying at the time. If a subsequent Interruption of Ongoing Behaviour happens within 5 sec. of the end of the first one, the length of the subsequent one (or ones) is added to the total.	3A, 3B, 3C, 4, 5, 6, 7, 8
Orients gaze to Stranger[a]	Behaviour coded in relation to Interruption of Ongoing Behaviour. Child looks towards Stranger (as Stranger either enters room (Episode 3A, 7), talks or interacts with child (Episode 3B, 3C) or leaves the room (Episode 4, 6).	3A, 3B, 3C, 4, 5, 6, 7, 8
Orients gaze to Mother[a]	Behaviour coded in relation to Interruption of Ongoing Behaviour. Child looks towards Mother (as Mother either leaves (Episode 4, 6) or enters (Episode 5, 7) the room.	3A, 3B, 3C, 4, 5, 6, 7, 8
Goes to Mother in reaction to Stranger (and stays within 50 cm) [c]	Time spend within 50 cm of the Mother after the child's behaviour has been interrupted by the Stranger. Count if child goes to the Mother within 30 sec. of having been interrupted by the Stranger. If more than 30 sec. has elapsed, count towards Goes to Mother in General.	3A, 3B, 3C
Goes to Mother in General (and stays within 50 cm)[c]	Time spend within 50 cm of the Mother at any point during the episode.	3A, 3B, 3C, 5, 8
Goes to Mother Total (and stays within 50 cm)[c]	Total time spend within 50 cm of the Mother regardless of reason within one episode.	3A, 3B, 3C, 5, 8
Goes to Mother in reaction to Separation (and stays within 50 cm)[c]	Time spend within 50 cm of the Mother after the child's behaviour has been interrupted by the Mother coming back into the room (Reunion). Count if child goes to the Mother within 30 sec. of having been interrupted by the Reunion. If more than 30 sec. has elapsed, count towards Goes to Mother in General.	5, 8
Approaches Stranger (within 50 cm)[b, c]	Number of times and length of time spent within 50 cm of Stranger. Count only the time where the child moved towards the Stranger and stayed with 50 cm and not when Stranger approaches the child.	3A, 3B, 3C, 4, 5, 7, 8
Spontaneous Interaction with Stranger[b, c]	Number of times and length of time child spontaneously interacts with Stranger without being prompted or without Stranger interacting first (e.g. giving a toy to Stranger or showing something to Stranger).	3A, 3B, 3C, 4, 5, 7, 8
Calling for Mother (or parent)[b]	Number of times child calls for Mother (or Father).	4, 6, 7
Tries to Open Door[b, c]	Number of times and length of time child tries to open the Door while the Mother is not in the room.	4, 6, 7
Hits the Door (or kicks)[b]	Number of times child taps, hits or kicks the Door while the Mother is not in the room.	4, 6, 7
Stays Near the Door (within 50 cm)[c]	Length of time the child spends within 50 cm of the Door while the Mother is not in the room.	4, 6, 7
Latency to stop crying when Mother is back[c]	Time it takes for the child to stop crying once the Mother has come back (Reunion).	5, 8
Latency to resume play when Mother is back[c]	Time is takes for the child to resume play when the Mother has come back (Reunion).	5, 8

SSP = Strange Situation procedure

[a]Behaviours measured as present or absent (yes/no)

[b]Behaviours measured in frequency (Number /Length of Episode in Seconds)

[c]Behaviours measured in duration of behaviour proportional to duration of episode (Time Spent Involved in the Behaviour/ Length of Episode in Seconds)

APPENDIX B

BEHAVIOURAL INHIBITION MEASURE (BIM): FACTOR, COMPOSITE AND THEORY SCORES FACTOR ANALYSIS AND RESULTS

B.1

BIM description, preliminary and main results

Behavioural Inhibition Measure (BIM):

Initially, 20 randomly selected videotapes were coded for all behaviours on all episodes in order to establish if factors representing behavioural inhibition would be identifiable in all episodes. Binomial variables were not analysed further since they added no additional significant information to the continuous measures. Episode 1 was omitted from the analysis because this short episode was not consistently recorded for all the participants. Episode 3 was separated into 3 parts (A, B, C; see Table 1) to facilitate coding, however parts were summed to get overall variable scores for the entire episode. For each coded episode, principal component analysis (PCA) was used to extract factors relating to behavioural inhibition. Orthogonal solutions (varimax) were used in this and all other PCA analyses. Scree plots and Eigenvalues above 1 were used to identify potential inhibition factors. Factors that grouped variables associated with inhibited or uninhibited profiles with loadings over .30 (i.e.: explaining approximately 10% of the factor variance). Factors explaining 20% of the overall variance or more were considered. The analysis revealed that episodes 2, 3 and 7 had factors that could be identified as descriptive of inhibited or uninhibited behaviour. The remaining episodes did not have clearly identifiable factors descriptive of inhibited or uninhibited behaviour. Thus episodes 2, 3 and 7 were retained for further coding of the remaining 57 videotapes. Prior to coding, redundant variables were removed: if more than one variable coded similar behaviours within an episode or if variables had correlation coefficients of .90 and above, only one of the two variables was retained for PCA. The variables retained for coding for each episode are shown in Table 3. Principal component analysis for all 77 participants on Episodes 2 (E2), 3 (E3) and 7 (E7) similarly revealed an inhibited-noninhibited factor per episode, as in the initial 20 participant analysis, and each accounted for more than 30% of the variance. This finding suggests that the results of the PCA are robust. The E2 inhibited-noninhibited factor had an Eigenvalue of 1.98 with 32.37% of the variance explained. Variable loadings were as follows: Spontaneous vocalizations (-.30), Vocalizations to mother (.33), Negative affect (.51), Proximity to mother 0-1m (.84), Proximity to mother 1-2m (-.77) and Play (-.44). The E3 factor had an Eigenvalue of 3.56 with 32.37% of the variance explained and variables loading above .30 were Interruption of behaviour (.43), Goes to mother due to stranger (.61), Vocalizations to mother (.73), Play (-.69), Play with stranger (-.70), Proximity to mother 0-1m (.47). Finally, the E7 factor, with an

Eigenvalue of 4.64 and 35.72% of the variance explained, had variable loadings above .30 for Spontaneous vocalizations (.72), Vocalization to Stranger (.61), Goes to stranger (.87), Spontaneous interaction with stranger (.37), Play (.76), Play with Stranger (.81), Proximity to door 0-1m (-.52) and Proximity to door 1-2m (.61).

Since each episode differed on its components (presence of mother, presence of both mother and stranger or only presence of stranger) and since none of the three factor scores correlated with each other (all $p>.05$), they potentially measure different aspects of behavioural inhibition and were therefore analysed separately to evaluate which best measured inhibited and uninhibited behaviour. In order to create a more generalizable inhibition score, composite scores were computed from summed standardized scores of variables with loadings .30 and over for each episode. Composite scores correlated strongly with their respective factor scores (E2, r= .97; E3, r= .83; E7, r= .89, all $ps<.001$).

As a further check of robustness, composite scores based on theoretical representation of a behavioural inhibited profile in the literature (Garcia-Coll et al., 19984; Reznick et al., 1989) were also computed. These theory scores were computed from summed standardized scores of the variables coded for each episode to represent inhibited-uninhibited scores where higher scores signified higher behavioural inhibition. The E2 theory score was composed of reversed spontaneous vocalizations, reversed vocalizations to the mother, negative affect, proximity to mother 0 to 1m, reversed proximity to mother 1 to 2 m, reversed proximity to mother 2m and over and reversed play. The E3 theory score was composed of reversed spontaneous vocalizations, reversed vocalizations to the mother and to the stranger, negative affect, interruption of behaviour due to stranger, goes to mother due to stranger, proximity to mother 0 to 1m, reversed proximity to mother 1 to 2 m, reversed proximity to mother 2m and over and reversed play and reversed play with stranger. Finally, the E7 theory score was composed of reversed spontaneous vocalizations, reversed vocalizations to the stranger, negative affect, calling for the mother, interruption of behaviour due to stranger, goes to the door due to stranger, reversed proximity to stranger 0 to 1m, proximity to stranger 1 to 2 m, proximity to stranger 2m and over and reversed play and reversed play with

stranger. Theoretical composite scores were also highly correlated with their respective factor scores and composite inhibition scores (E2, r= .80; E3, r= .55; E7, r= .75, all *p*s<.001).

In summary, three episodes of the strange situation had components consistent with capturing variation in inhibited-uninhibited behaviours, and three scores were calculated per episode, a factor score, a composite score, and a theory based composite score. High scores on factor, composite and theoretical BIM scores indicate high levels of behavioural inhibition. A coder trained by the main author and blind to inhibition and attachment classification coded 10 randomly selected videotapes. Intra-class correlations between the raters variable scores ranged from .90 to 1.00 (ps <.001) for Episode 2, from .80 to 1.00 (ps<.01) for Episode 3 and 64 to 1.00 for Episode 7 (ps< .05). Although one variable had a low ICC (.64), the next lowest coefficient for Episode 7 was .95.

Results

Divergent validity of the BIM score with attachment classification

None of the BIM factor, BIM composite or BIM theory based scores were significantly related to attachment scores: E2 factor (ANOVA, $F(2, 67) = 1.29$, $p = .28$), E2 composite ($F(2, 67) = 1.47$, $p = .24$), E2 theory ($F(2, 67) = 0.77$, $p = .47$), E3 factor ($F(2, 68) = 1.11$, $p = .33$), E3 composite ($F(2, 68) = 0.14$, $p = .87$), E3 theory ($F(2, 69) = 0.14$, $p = .87$), E7 factor ($F(2, 63) = 1.21$, $p = .31$), E7 composite ($F(2, 63) = 1.89$, $p = .16$) and E7 theory ($F(2, 63) = 8.82$, $p = .44$). Similar results were found when BIM scores were correlated with attachment as a continuous score (all *ps* > .05).

Convergent and divergent validity of the BIM with temperament questionnaires: Infant Behaviour Questionnaire-Revised (IBQ-R), Early Childhood Behaviour Questionnaire (ECBQ) and the Non-caregiver Observational Temperament AQS-based scale (N-COTA).

Convergent validity of the BIM scores were examined in relation to the Fear and Approach scales of the IBQ-R questionnaire. Pearson correlations revealed significant positive associations between maternal reports of Fear scores and all E2 BIM scores (E2 factor, $r = .33$, p=.023; E2 composite, $r = .34$, p=.019; E2 theory, $r = .31$, p=.034). As

children's IBQ Fear scores increased, their E2 BIM scores also increased. Furthermore, all E2 BIM scores negatively correlated with the IBQ-R Approach scale (E2 factor, r = -.46, p=.001; E2 composite, r = -.50, p<.001; E2 theory, r = -.37, p=.011). Therefore, children who scored higher on the IBQ-R Approach scale had lower E2 BIM scores. There were no significant relationships between Fear or Approach scores and the child's E3 and E7 BIM scores (all ps > .05; see Table B1).

The Shyness and Sociability scales of the ECBQ were also used to examine BIM convergent validity. The E2 factor and composite scores were significantly correlated with the Shyness scale (E2 factor, r = .29, p=.019; E2 composite, r = .28, p=.026). Pearson correlation revealed a non-significant trend (approached statistical significance'?) for the E2 theory score and the Shyness scale (r = .22, p=.081). Children with higher E2 BIM scores also had higher scores on the ECBQ Shyness scale. All E2 BIM scores negatively correlated with the ECBQ Sociability scale (E2 factor, r = -.33, p=.008; E2 composite, r = -.30, p=.016; E2 theory, r = -.26, p=.033). Therefore, as children's Approach scores increased, children's E2 BIM scores decreased. Only the E3 theory score was significantly associated with the Shyness scale (E2 theory, r = .26, p=.033). None of the other E3 BIM scores and none of the E7 BIM scores were significantly correlated with either the Shyness or the Sociability scales of the ECBQ (all ps > .05, see Table B1).

Convergent validity was also examined with a non-caregiver reported questionnaire, the N-COTA. Pearson correlations revealed that all E2 BIM scores were significantly correlated with the N-COTA (E2 factor, r = .46, p=.001; E2 composite, r = .48, p=.001; E2 theory, r = .43, p=.003). As children's E2 BIM scores increased, their scores on the N-COTA increased also. Once again, only the E3 theory score was significantly associated with the N-COTA (r = .30, p=.036). None of the other E3 scores or any of the E7 scores were significantly correlated with the N-COTA (all ps > .05, see Table B1).

Divergent validity of the BIM was assessed by comparing the score to all other IBQ-R scales. For the E2 BIM score, no significant relationships were found with any of the remaining IBQ-R scores (all ps > .05; refer to Table B1). However, the E3 BIM factor score

was related to the IBQ-R falling reactivity/rate of recovery from distress scale (r = .28, p=.05) as well as the cuddliness scale (r = .29, p=.043). None of the other E3 BIM scores were related to the remaining IBQ-R scores. Finally, the E7 BIM factor score was also related to the cuddliness scales (r = -.29, p=.05) of the IBQ-R as well as to the high pleasure scale (r = -.34, p=.020). No other IBQ-R scales were related to the E7 BIM score (see Table B1).

Furthermore, when examining the remaining ECBQ scales, the E2 BIM score was also associated with the Activity scale (E2 factor, r = -.32, p=.010; and E2 composite, r = -.29, p=.017), the Motor scale (E2 factor, r = -.27, p=.033; E2 composite, r = -.27, p=.027; E2 theory, r = -.34, p=.005) and the Perceptual scale (E2 factor, r = -.26, p=.035; and E2 theory, r = -.26, p=.039). The E3 BIM theory score was negatively correlated with the Activity scale of the ECBQ (r = -.26, p=.031) and was positively correlated with the Attention scale (r = .31, p=.012). There were no significant associations found with any ECBQ scales and the E7 BIM score (see Table B1).

In sum, the E2 behavioural inhibition measure, based on Episode 2 of the strange situation procedure, correlated most strongly with those temperament scales theoretically linked to behavioural inhibition. The E2 theoretical composite version of the score was most generalizable and would be most easily computed for future experiments. For these reasons the E2 theoretical composite behavioural inhibition measure (E2 theory BIM) was used in all subsequent analyses. The E2 theoretical composite BIM score will henceforth be referred to as the BIM score.

Insert Table B1

B.2

Table B1

Table B1. *Correlations between behavioural inhibition measures (BIM) factor, composite and theory scores with revised Infant behaviour questionnaire (IBQ-R), the Early childhood behaviour questionnaire (ECBQ) and Non-caregiver observational temperament scale (N-COTA).*

		E2			E3			E7		
		Factor	Composite	Theory	Factor	Composite	Theory	Factor	Composite	Theory
IBQ-R	Activity Level	-0.19	-0.15	-0.16	-0.11	-0.15	-0.13	0.16	0.19	0.13
	Distress to limitation	0.07	0.04	-0.003	-0.25	-0.15	-0.02	0.10	0.14	0.14
	Approach	**-0.46****	**-0.50****	**-0.37****	-0.01	-0.09	-0.06	-0.19	-0.25	-0.28
	Fear	**0.33***	**0.34***	**0.31***	0.02	0.06	0.18	0.05	0.04	0.09
	Duration of orientation	-0.08	-0.07	0.02	0.04	0.003	0.11	-0.18	-0.17	-0.19
	Smiling & Laughter	-0.25	-0.26	-0.26	0.12	0.04	-0.07	-0.01	-0.12	-0.07
	Vocal reactivity	-0.22	-0.19	-0.24	0.03	-0.08	-0.10	-0.04	-0.13	-0.21
	Sadness	-0.03	-0.01	0.06	-0.24	-0.16	0.01	0.03	0.13	0.16
	Perceptual Sensitivity	-0.21	-0.16	-0.09	-0.16	-0.03	0.04	0.19	0.17	0.20
	High-intensity Pleasure	-0.17	-0.18	-0.15	0.07	-0.09	-0.21	**-0.34***	-0.29	-0.25
	Low-intensity Pleasure	-0.08	-0.09	-0.05	0.17	0.08	-0.01	-0.18	-0.10	-0.13
	Cuddliness	-0.16	-0.15	-0.12	**0.29***	0.15	-0.05	**-0.29***	-0.20	-0.16
	Soothability	-0.10	-0.06	0.03	0.23	0.26	0.19	0.07	0.04	-0.07
	Falling Reactivity[a]	-0.14	-0.10	-0.04	**0.28***	0.22	-0.01	-0.23	-0.24	-0.22
ECBQ	Activity Level/Energy	**-0.32***	**-0.29***	-0.23	-0.20	-0.20	**-0.26***	-0.13	-0.09	-0.07
	Attentional Focusing	0.17	0.21	0.11	0.17	0.21	**0.31***	0.07	0.09	0.09
	Attentional Shifting	0.05	0.09	0.06	0.11	0.13	0.09	0.13	0.12	-0.01
	Cuddliness	0.09	0.13	0.20	-0.01	0.09	0.16	0.12	0.14	0.20
	Discomfort	-0.07	-0.07	-0.14	0.04	0.04	0.03	0.19	0.12	0.07
	Fear	0.04	0.03	-0.01	-0.06	-0.01	0.08	0.16	0.18	0.18
	Frustration	-0.05	-0.02	-0.11	-0.21	-0.19	-0.18	0.04	0.10	0.06
	High-intensity Pleasure	-0.23	-0.23	-0.21	-0.02	-0.01	-0.13	-0.10	-0.06	0.004
	Impulsivity	-0.06	-0.04	-0.04	0.14	0.07	-0.04	-0.001	-0.10	-0.15
	Inhibitory Control	0.08	0.09	0.14	0.06	0.06	0.04	0.03	0.01	0.04
	Low-intensity Pleasure	0.07	0.12	0.12	0.10	0.17	0.10	-0.07	0.04	-0.07
	Motor Activation	**-0.27***	**-0.27***	**-0.34***	-0.17	-0.15	-0.19	-0.18	-0.12	-0.07
	Perceptual Sensitivity	**-0.26***	-0.22	**-0.26***	0.07	0.06	0.002	-0.03	-0.10	-0.19
	Positive Anticipation	0.07	0.08	0.01	0.04	0.09	0.04	0.05	0.02	-0.09
	Sadness	-0.09	-0.07	-0.11	-0.05	-0.05	-0.06	-0.06	-0.06	-0.09
	Shyness	**0.29***	**0.28***	0.22	0.07	0.19	**0.26***	0.15	0.25	0.21
	Sociability	**-0.33****	**-0.30****	**-0.26***	0.10	0.03	-0.10	-0.16	-0.19	-0.20
	Soothability	-0.05	-0.02	0.05	0.17	0.11	-0.02	-0.07	-0.08	-0.10
N-COTA		**0.46****	**0.48****	**0.43****	0.01	-0.16	**-0.30***	-0.05	-0.25	-0.20

APPENDIX C

CONSENT FORMS

C.1

Consent form at age 6 months

CENTRE
DE RECHERCHE
Hôpital
Douglas
Hospital
RESEARCH CENTRE

Maternal Adversity, Vulnerability and Neurodevelopment
Principal Investigator: Michael Meaney, PhD

CONSENT FORM FOR THE 6-MONTH VISITS

1. Introduction

Health during adulthood is strongly affected by environmental conditions prevailing during childhood. This study tries to measure the effects of the environment, most importantly maternal well-being, on infant development. We are also looking at the effect of stress on the interactions between a mother and her infant, as well as on the infant's early development. For these purposes, we will ask you and your infants to take part in home and laboratory visits. First, this study requires interviews with you, filling out questionnaires about your infant and visits to check your infant's development over a period of 3-years (specifically, at 6, 12, 18, 24 and 36 months). Second, at specific ages, we will ask that you and your infant come to the laboratory for a period of computer-based tests. These tests will not involve any invasive procedures, such as blood sampling. The only samples that will be collected during these tests will be oral saliva. The objective of this research is to study how environments can affect mothers and their infants. It is hoped that the knowledge derived from this study will contribute to the understanding of normal development and risk factors for disease during infancy and childhood.

2. Procedures

For the six month assessment, we will visit you at your house at two different times and we will ask you to come once to the laboratory for computer-based evaluations of your child.

a) Home visit: First visit (90 minutes)

Interview

The interview will be performed at the first visit and will assess your current living conditions, the sources of stress in your life, your relationship with your new child, and the support you receive from family and friends. We expect the interview to take about 90 minutes to complete.

b) Home visit: Second visit (60 minutes)

Questionnaire

A short questionnaire will assess the health of your infant since his birth , breastfeeding, and your satisfaction with your living conditions.

Mother-infant interactions

For 20 minutes, we will ask you to be with your child as if you were alone and we will make a tape (or film) of the activities. This will help us learn about the things you and your infant do when you are home together.

Infant assessment

A trained interviewer will present your child a set of games and tasks called the Bayley Scales of Infant development, for which typical behaviours of infants of different ages are well known (cognitive, language, personal-social, and motor development as well as child test-taking behaviors). This scale uses play behavior and observations of your child and lasts 30 minutes for the 6 month evaluation.

Cortisol sampling

We will be measuring your levels of the hormone cortisol in saliva. This will involve taking samples of your saliva 7 times per day for 2 days. In order to do that, you will be asked to gently chew on a cotton swab for about one minute. After, you will take the cotton swab out of your mouth and put it back into a plastic container. Samples of your child saliva will be taken twice a day for two consecutive days (using Q-tips).

c. Laboratory visits (25 minutes)

During the laboratory visits, the time required for individual infant tasks is adjusted to the age of your child at each visit. The tests have been used many times across North America with children as young as 4-6 months. The 6 months laboratory tests will be 2 different computer-based tasks (mostly like video games). The infant is in a curtained enclosure, in an infant seat or highchair, or on mother's lap, facing a display of three monitors. Mother-child separation does not occur during the laboratory assessement.

Questionnaires

In order to check your child development, we will give you a questionnaire about different aspects of your infant's abilities and characteristics. The Early Childhood Behavior questionnaire is widely used parent-report measure of infant temperament (impulsivity, affectivity and effortful control). In addition we will adminster a short questionnaire about your thoughts and feelings about having a child.

The information obtained from the all the home and laboratory assessments will be identified only by a participant number.

3. Risks

There are no anticipated risks of participation in this study, other than the possibility that some questions might be somewhat personal, difficult to answer, or upsetting for some individuals. You can choose not to answer any question at any time. If your child should become distressed or uneasy during a session or if unexpected circumstances occur, you can ask to have the session paused for a few minutes, or to resume the entire session at a later time. These are routine tests used across North America and without any known health risk or consequences.

4. Benefits

The possible benefit of participating in this study is that you will have an opportunity to speak with another woman about your feelings, thoughts, and experiences during this time with your new child. In addition, the results of the study may help to explain why some people are more affected by the negative effects of stress on health, and also how stress affects children's development.

5. Compensation

You will be remunerated 25$ for each home visit and again for the laboratory evaluations as compensation for your time and inconvenience.

6. Your Rights

You are under no obligation to take part in this study. You have the right to ask questions at any time. Moreover, should you choose to participate in this study, you may withdraw from the study at any point or you may withdraw your child at any point without any consequence or penalty, to you or your child.

7. Ombudsman

If you would like to discuss your participation with an individual not directly involved in the project, we invite you to contact the Ombudsman of the Douglas Hospital at the following number: (514) 761-6131, #3287.

8. Confidentiality

All of the personal information obtained in this study will remain confidential. No information will be released by the research team without your consent except as specifically required by law.

Should you wish at any time, now or later, to contact a person who can give you information about the study, please use the following correspondence address:

Michael Meaney, PhD
Principal Investigator
Douglas Hospital Research Center
6875 Blvd. LaSalle
Montreal, QC
Canada
H4H1R3
(514)-761-6131 ext. 3938
michael.meaney@mcgill.ca

Helene Gaudreau, PhD
Research Coordinator
Douglas Hospital
(514)-761-6131 ext.3928
helene.gaudreau@douglas.mcgill.ca

9. Access to previous data

You have previously participated in the Montreal prematurity Study under the supervision of Dr. Michael Kramer, who is a member of our research team. We ask that you grant us permission to access the data associated with your participation in the study. Your agreement to participate in the current study will indicate your agreement.

10. Possibility of Brain scanning

In addition to the described tests, there is a possibility that we request your child participation in a brain scanning assessment at 36 months. You are perfectly free to take part or decline any component of this project.

Itemized Consent for the 6 months evaluation

I acknowledge that the study has been explained to me. I have also been given the opportunity to ask questions about the goals and procedures of the study. In signing this consent form, I give my consent to participate and I give consent for my child, _____ (please print your child's full name) to also take part in this study. I acknowledge receiving a copy of the consent form.

Interviews and questionnaires:

☐ I give my consent to participate in the 90 minute interview and in filling questionnaires about my infant.

☐ I do not wish to participate in the 90 minute interview and in filling questionnaires about my infant.

Saliva Sampling:

☐ I give my consent to participate in the 2-day saliva sampling procedure.

☐ I do not wish to participate in the 2-day saliva sampling procedure.

☐ I give my consent for my child participation in the 2-day saliva sampling procedure.

☐ I do not wish my child to participate in the 2-day saliva sampling procedure.

Mother-infant Assessments:

☐ I give my consent to participate in the video-recording assessment of mother-infant interactions.

☐ I do not wish to participate in the video-recording assessment of mother-infant interactions.

Home infant assessments

☐ I give my consent for my child to take part in the home assessment (Bayley scale).

☐ I do not wish my child to take part in the home assessment (Bayley scale).

Laboratory assessments

☐ I give my consent for my child to take part in the laboratory assessments.

☐ I do not wish my child to take part in the laboratory assessments.

Consent

I acknowledge that the study has been explained to me. I have also been given the opportunity to ask questions about the goals and procedures of the study. In signing this consent form, I give my consent to participate, and I give consent for my child, _____ (please print your child's full name) to also take part in this study. I acknowledge receiving a copy of the consent form.

_____	_____	_____
Name of Participant	Name of Witness	Name of Investigator
_____	_____	_____
Signature of Participant	Signature of Witness	Signature of Investigator
_____	_____	_____
Date	Date	Date

C.2

Consent form at age 18 months

CENTRE
DE RECHERCHE
Hôpital
Douglas
Hospital
RESEARCH CENTRE

Maternal Adversity, Vulnerability and Neurodevelopment
Principal Investigator: Michael Meaney, PhD

CONSENT FORM FOR THE 18 MONTH VISITS

1. Introduction

Health during adulthood is strongly affected by environmental conditions prevailing during childhood. This study tries to measure the effects of the environment, most importantly maternal well-being, on infant development. We are also looking at the effect of stress on the interactions between a mother and her infant, as well as on the infant's early development. For these purposes, we will ask you and your infant to take part in home and laboratory visits. First, this study requires interviews with you, filling out questionnaires about your infant and visits to check your infant's development over a period of 3-years (specifically, at 6, 12, 18, 24 and 36 months). Second, at specific ages, we will ask that you and your infant come to the laboratory for a period of computer-based tests. These tests will not involve any invasive procedures, such as blood sampling. The only samples that will be collected during these tests will be oral saliva. The objective of this research is to study how environments can affect mothers and their infants. It is hoped that the knowledge derived from this study will contribute to the understanding of normal development and risk factors for disease during infancy and childhood. . .

2. Procedures

For the 18 month assessment, we will come to your house twice and we will also ask you to come to the laboratory for an assessment of your child.

a) Home visit n°1 (150 minutes)

Questionnaires

The first two questionnaires are short and will assess the health and sleep pattern of your infant over the last six months. Another questionnaire will ask you to evaluate your satisfaction with your present living conditions. The final questionnaire refers to your feelings and thoughts in regards to having a child (CAQ).

Mother-infant interactions

We will be observing you and your infant during your normal home activities. This allows us to see how your child interacts with his or her environment. Also, we will ask you questions about the daily routine (e.g.: meals, games, naps, etc.). In the course of the interview, we will observe and film a 20 minutes play session with you and your infant. Furthermore, a research assistant will give you a copy of this tape as a souvenir a few days later.

b) Home visit n°2 (150 minutes)

Infant assessment

In order to check your child development, a trained interviewer will present your child a set of games and activites called the Bayley Scales of Infant development, for which typical behaviours of infants of different ages are well known (cognitive, language, personal-social, and motor development as well as child test-taking behaviors). This scale uses play behavior and observations of your child and lasts 100 minutes. Also, we will take 4 saliva samples from you and your child during this assessment.

Questionnaire

The Early Childhood Behavior questionnaire that you will fill out is a widely used parent-report measure of infant temperament (impulsivity, affectivity and effortful control).

Actiwatch

We will ask you to place a small watch-like device on your child's wrist for a period of 8 days in a row. This watch is sensitive to movement and will measure the quality of your infant's sleep. This will allow us to know when your child sleeps and when s/he is awake and moving. We will ask you to remove the sleep-watch before you give her/him a bath and to put it back right after the bath, so that the water will not damage the watch. We will also ask you to complete a

short sleep diary during this week to inform us mainly on your child's bed time and wake up time.

c) <u>Laboratory visit (150 minutes)</u>

Strange situation

During this test, we will be observing your child's response to a momentary separation from you, as well as how s/he reacts to your return. This gives us an idea of the different strategies your child uses to comfort herself/himself when you are gone and how s/he uses you for comfort when you come back. Mother-child separations are no more than 3 or 6 minutes. Separations are always shortened if a child is distressed more than briefly. This observation will be recorded on videotape for later review.

Playroom

Because the Strangè Situation can cause some stress to the child, we organized a 60-minutes play period to help the child relax.

Computer-based tasks

The last part of this visit consists of computer-based tasks. Your child will be viewing images and pictures on three computer screens (animations with music and pictures of human faces).These tasks measure infants' attention patterns and impulsivity.

Cortisol sampling

During the visit, we will be measuring your own and your infant's levels of the hormone cortisol in saliva. This involves taking five saliva samples: once before the *Strange Situation test* and then, 20, 40 and 60 minutes after. A final sample will be taken shortly after the computer-based tasks.

Questionnaire

Finally, in order to properly assess your child's development, we will ask you to fill out a questionnaire about different aspects of your infant's abilities and characteristics. The Infant-Toddler Social and Emotional Assessment (ITSEA) is a parent-report questionnaire, designed to measure the social-emotional competencies of 1-2 year-olds children.

All information obtained during the home and laboratory assessements remain confidential and will be identified only by a participant number.

3. Risks

There are no anticipated risks of participation in this study, other than the possibility that some questions might be somewhat personal, difficult to answer, or upsetting for some individuals. You can choose not to answer any question at any time. If your child should become distressed or uneasy during a session or if unexpected circumstances occur, you can ask to have the session paused for a few minutes, or to resume the entire session at a later time. These are routine tests used across North America and without any known health risk or consequences.

4. Benefits

The possible benefit of participating in this study is that you will have an opportunity to speak with another woman about your feelings, thoughts, and experiences during this time with your new child. In addition, the results of the study may help to explain why some people are more affected by the negative effects of stress on health, and also how stress affects children's development.

5. Compensation

You will be remunerated 25$ for each home visit and 50$ for the laboratory evaluation for a total of 100$ as compensation for your time and inconvenience.

6. Your Rights

You are under no obligation to take part in this study. You have the right to ask questions at any time. Moreover, should you choose to participate in this study, you may withdraw from the study at any point or you may withdraw your child at any point without any consequence or penalty, to you or your child.

7. Ombudsman

If you would like to discuss your participation with an individual not directly involved in the project, we invite you to contact the Ombudsman of the Douglas Hospital at the following number: (514) 761-6131, #3287.

8. Confidentiality

All of the personal information obtained in this study will remain confidential. No information will be released by the research team without your consent except as specifically required by law.

Should you wish at any time, now or later, to contact a person who can give you information about the study, please use the following correspondence address:

Michael Meaney, PhD
Principal Investigator
Douglas Hospital Research Center
6875 Blvd. LaSalle
Montreal, QC
Canada
H4H1R3
(514)-761-6131 ext. 3938
michael.meaney@mcgill.ca

Helene Gaudreau, PhD
Research Coordinator
Douglas Hospital
(514)-761-6131 ext. 2827
helene.gaudreau@douglas.mcgill.ca

Itemized Consent for the 18 month evaluation

I acknowledge that the study has been explained to me. I have also been given the opportunity to ask questions about the goals and procedures of the study. In signing this consent form, I give my consent to participate and I give consent for my child, _____ _____ (please print your child's full name) to also take part in this study. I acknowledge receiving a copy of the consent form.

a) <u>Home visit 1</u>

Mother-infant Assessments:
☐ I give my consent to participate in the assessment of mother-infant interactions.

☐ I do not wish to participate in the assessment of mother-infant interactions.

Video of mother-infant interaction:
☐ I give my consent to participate in the video of mother-infant interaction.

☐ I do not wish to participate in the video of mother-infant interaction.

Questionnaires:
☐ I give my consent to participate in filling out questionnaires about my infant.

☐ I do not wish to participate in filling out questionnaires about my infant.

b) <u>Home visit 2</u>

Infant evaluation :
☐ I give my consent for my child's participation in the Bayley development evaluation.

☐ I do not wish my child to participate in the Bayley development evaluation.

Saliva Sampling:
☐ I give my consent for my participation in the saliva sampling procedure.

☐ I do not wish to participate in the saliva sampling procedure.

☐ I give my consent for my child's participation in the saliva sampling procedure.

☐ I do not wish my child to participate in the saliva sampling procedure.

Questionnaire
☐ I give my consent in filling out the questionnaire (I.T.S.E.A.)

☐ I don't give my consent to fill out the questionnaire (I.T.S.E.A.)

Actiwatch
☐ I give my consent for my child's participation in the 8-day actiwatch sleep recording.

☐ I do not wish that my child participates in the 8-day actiwatch sleep recording.

c) <u>Lab visit</u>

Laboratory assessments

☐ I give my consent for my child to take part in the laboratory assessments.

☐ I do not wish my child to take part in the laboratory assessments.

Saliva Sampling:

☐ I give my consent for my participation in the saliva sampling procedure.

☐ I do not wish to participate in the saliva sampling procedure.

☐ I give my consent for my child participation in the saliva sampling procedure.

☐ I do not wish my child to participate in the saliva sampling procedure.

Consent

I acknowledge that the study has been explained to me. I have also been given the opportunity to ask questions about the goals and procedures of the study. In signing this consent form, I give my consent to participate, and I give consent for my child, _____ _____ (please print your child's full name) to also take part in this study. I acknowledge receiving a copy of the consent form.

_____	_____	_____
Name of Participant	Name of Witness	Name of Investigator
_____	_____	_____
Signature of Participant	Signature of Witness	Signature of Investigator
_____	_____	_____
Date	Date	Date

C.3

Consent form at age 6

Université du Québec à Montréal
Case postale 8888, Succursale "A"
Montréal, P.Q. H3C 3P8

NO:_____

FORMULAIRE DE CONSENTEMENT

Par la présente nous consentons à participer à la recherche du Dr. Ellen Moss sur les milieux de vie de l'enfant.

_____ _____
Signature du parent Date

Je déclare être au courant que certains épisodes de la visite à l'Université seront filmés et que ce film ne sera utilisé que pour des fins de recherche et d'enseignement seulement.

_____ _____
Signature du parent Date

C.4

Consent form at age 14

Projet de recherche

Sous la direction de Mme Ellen Moss, Ph. D. Université du Québec à Montréal

AUTORISATON

Par la présente, nous consentons à participer à la recherche sur le milieu de vie de l'enfant.

Je déclare être au courant que certains épisodes de ma visite au laboratoire seront filmés et que ce film ne sera utilisé que pour des fins de recherche seulement.

J'accepte que les renseignements révélés par mon enfant soient confidentiels. À cet effet, je ne pourrai que faire la demande d'un résumé des résultats sans pour autant avoir accès aux confidences dévoilés par mon enfant.

Ellen Moss, Ph.D.
Département de Psychologie
Université du Québec à Montréal
C.P. 8888, Succ. Centre-Ville
Montréal (Québec)
H3C 3P8
Tél. : 987-3000 poste 8525

_____
Signature du participant

_____
Date

C.5

Consent form at age 21

Projet de recherche

Sous la direction de Mme Ellen Moss, Ph. D. Université du Québec à Montréal

Formulaire de consentement

Ce formulaire vise à recueillir votre consentement à participer à cette prochaine étape de notre recherche dont les objectifs consistent à observer le développement et l'adaptation de l'individu dans ses différents milieux de vie.

La participation à cette étude consiste en deux séances d'environ 90 minutes qui sont prévues à l'Université du Québec à Montréal. Au cours de celles-ci, vous serez invité à compléter des questionnaires et à faire une entrevue au cours de laquelle il vous sera demandé, entre autres, de décrire vos expériences d'enfance et les événements importants de votre vie. Cette entrevue sera enregistrée sur cassette audio et la transcription sur support informatique qui en suivra ne permettra pas de vous identifier. Le lieu et l'heure de l'entrevue sont à déterminer avec l'intervieweur. Afin d'assurer vos frais de déplacement et pour vous remercier de votre collaboration, un dédommagement de 20 $ vous sera remis suite à la première rencontre et de 20 $ suite à la deuxième.

Votre participation contribuera à l'avancement des connaissances en améliorant la compréhension de l'effet des expériences passées avec ses parents dans le développement des individus. Il n'y a pas de risque d'inconfort important associé à votre participation à cette étude. Toutefois, certaines questions pourraient raviver des émotions désagréables liées à votre enfance. Vous demeurerez donc libre de ne pas répondre à une question que vous estimez embarrassante et cela, sans avoir à vous justifier. Une ressource d'aide appropriée pourra vous être proposée si vous souhaitez discuter de votre situation et l'intervieweur pourra décider de suspendre ou de mettre fin à l'entrevue s'il estime que votre bien-être est menacé.

Soyez assuré que toute information concernant votre identité demeurera confidentielle. Afin de protéger l'anonymat des participants, les noms des personnes prenant part à l'étude seront remplacés par des numéros d'identification. Toutes les données seront conservées pendant 10 ans.

Votre participation à ce projet est volontaire, ce qui signifie que vous acceptez de participer au projet sans aucune contrainte ou pression extérieure et que vous êtes libre d'y mettre fin en tout temps, dans lequel cas les renseignements vous concernant seraient détruits. Les renseignements recueillis dans le cadre de ce projet pourront être utilisés à des fins scientifiques et pédagogiques (articles, conférences et communications scientifiques), mais aucune information permettant de vous identifier ne sera divulguée publiquement à moins d'un consentement explicite de votre part.

Toute question sur le projet, critique ou plainte peut être adressée à la chercheure principale, Mme Ellen Moss dont les coordonnées apparaissent au bas de ce document. Par contre, toute plainte non résolue avec la chercheure principale peut être adressée au Comité institutionnel d'éthique de la recherche avec des êtres humains de l'UQAM : Service de la recherche et de la création, C.P. 8888, Succ. Centre-Ville, Montréal (Québec) H3C 3P8; téléphone 987-3000, poste 7753.

Je déclare avoir pris connaissance des différents aspects liés à ma participation à cette recherche et confirme avoir obtenu un exemplaire du formulaire de consentement.

Ellen Moss, Ph.D.
Département de Psychologie
Université du Québec à Montréal
C.P. 8888, Succ. Centre-Ville
Montréal (Québec)
H3C 3P8
Tél. : 987-3000 poste 8525

_____
Signature du participant

_____
Date

_____
Personne témoin

APPENDIX D

INSTRUMENTS

D.1

Infant Behavior Questionnaire-Revised

Subject no_____ **DCC ID:** _____

RA name: _____ **Date:** _____

Infant Behavior Questionnaire - Revised

Date of Baby's Birth _____ ___ _____ Age of Child _____ _____
month. day year mos. weeks

Sex of Child _____

INSTRUCTIONS:

Please read carefully before starting:

As you read each description of the baby's behavior below, please indicate how often the baby did this during the LAST WEEK (the past seven days) by circling one of the numbers in the left column. These numbers indicate how often you observed the behavior described during the last week.

(1) Never	(2) Very Rarely	(3) Less Than Half the Time	(4) About Half the Time	(5) More Than Half the Time	(6) Almost Always	(7) Always	(X) Does Not Apply

The "Does Not Apply" (X) column is used when you did not see the baby in the situation described during the last week. For example, if the situation mentions the baby having to wait for food or liquids and there was no time during the last week when the baby had to wait, circle the (X) column. "Does Not Apply" is different from "Never" (1). "Never" is used when you saw the baby in the situation but the baby never engaged in the behavior listed during the last week. For example, if the baby did have to wait for food or liquids at least once but never cried loudly while waiting, circle the (1) column.

Please be sure to circle a number for <u>every</u> item.

(1) Never	(2) Very Rarely	(3) Less Than Half the Time	(4) About Half the Time	(5) More Than Half the Time	(6) Almost Always	(7) Always	(X) Does Not Apply

Feeding

During feeding, how often did the baby:
1 2 3 4 5 6 7 X . . . . (1) lie or sit quietly?
1 2 3 4 5 6 7 X . . . . (2) squirm or kick?
1 2 3 4 5 6 7 X . . . . (3) wave arms?
1 2 3 4 5 6 7 X . . . . (4) notice lumpy texture in food (e.g., oatmeal)?

In the last week, while being fed in your lap, how often did the baby:
1 2 3 4 5 6 7 X . . . . (5) seem to enjoy the closeness?
1 2 3 4 5 6 7 X . . . . (6) snuggle even after she was done?
1 2 3 4 5 6 7 X . . . . (7) seem eager to get away as soon as the feeding was over?

How often did your baby make talking sounds:
1 2 3 4 5 6 7 X . . . . (8) while waiting in a high chair for food?
1 2 3 4 5 6 7 X . . . . (9) when s/he was ready for more food?
1 2 3 4 5 6 7 X . . . . (10) when s/he has had enough to eat?

Sleeping

Before falling asleep at night during the last week, how often did the baby:
1 2 3 4 5 6 7 X . . . . (11) show no fussing or crying?

During sleep, how often did the baby:
1 2 3 4 5 6 7 X . . . . (12) toss about in the crib?
1 2 3 4 5 6 7 X . . . . (13) move from the middle to the end of the crib?
1 2 3 4 5 6 7 X . . . . (14) sleep in one position only?

After sleeping, how often did the baby:
1 2 3 4 5 6 7 X . . . . (15) fuss or cry immediately?
1 2 3 4 5 6 7 X . . . . (16) play quietly in the crib?
1 2 3 4 5 6 7 X . . . . (17) cry if someone doesn't come within a few minutes?

How often did the baby:
1 2 3 4 5 6 7 X . . . . (18) seem angry (crying and fussing) when you left her/him in the crib?
1 2 3 4 5 6 7 X . . . . (19) seem contented when left in the crib?
1 2 3 4 5 6 7 X . . . . (20) cry or fuss before going to sleep for naps?

When going to sleep at night, how often did your baby:
1 2 3 4 5 6 7 X . . . . (21) fall asleep within 10 minutes?
1 2 3 4 5 6 7 X . . . . (22) have a hard time settling down to sleep?
1 2 3 4 5 6 7 X . . . . (23) settle down to sleep easily?

(1) Never	(2) Very Rarely	(3) Less Than Half the Time	(4) About Half the Time	(5) More Than Half the Time	(6) Almost Always	(7) Always	(X) Does Not Apply

When your baby awoke at night, how often did s/he:
1 2 3 4 5 6 7 X . . . . (24) have a hard time going back to sleep?
1 2 3 4 5 6 7 X . . . . (25) go back to sleep immediately?

When put down for a nap, how often did your baby:
1 2 3 4 5 6 7 X . . . . (26) stay awake for a long time?
1 2 3 4 5 6 7 X . . . . (27) go to sleep immediately?
1 2 3 4 5 6 7 X . . . . (28) settle down quickly?
1 2 3 4 5 6 7 X . . . . (29) have a hard time settling down?

When it was time for bed or a nap and your baby did not want to go, how often did s/he:
1 2 3 4 5 6 7 X . . . . (30) whimper or sob?
1 2 3 4 5 6 7 X . . . . (31) become tearful?

Bathing and Dressing

When being dressed or undressed during the last week, how often did the baby:
1 2 3 4 5 6 7 X . . . . (32) wave her/his arms and kick?
1 2 3 4 5 6 7 X . . . . (33) squirm and/or try to roll away?
1 2 3 4 5 6 7 X . . . . (34) smile or laugh?
1 2 3 4 5 6 7 X . . . . (35) coo or vocalize?

When put into the bath water, how often did the baby:
1 2 3 4 5 6 7 X . . . . (36) smile?
1 2 3 4 5 6 7 X . . . . (37) laugh?
1 2 3 4 5 6 7 X . . . . (38) splash or kick?
1 2 3 4 5 6 7 X . . . . (39) turn body and/or squirm?

When face was washed, how often did the baby:
1 2 3 4 5 6 7 X . . . . (40) smile or laugh?
1 2 3 4 5 6 7 X . . . . (41) fuss or cry?
1 2 3 4 5 6 7 X . . . . (42) coo?

When hair was washed, how often did the baby:
1 2 3 4 5 6 7 X . . . . (43) smile?
1 2 3 4 5 6 7 X . . . . (44) fuss or cry?
1 2 3 4 5 6 7 X . . . . (45) vocalize?

(1) Never	(2) Very Rarely	(3) Less Than Half the Time	(4) About Half the Time	(5) More Than Half the Time	(6) Almost Always	(7) Always	(X) Does Not Apply

Play

How often during the last week did the baby:

1 2 3 4 5 6 7 X . . . . (46) look at pictures in books and/or magazines for 2-5 minutes at a time?
1 2 3 4 5 6 7 X . . . . (47) look at pictures in books and/or magazines for 5 minutes or longer at a time?
1 2 3 4 5 6 7 X . . . . (48) stare at a mobile, crib bumper or picture for 5 minutes or longer?
1 2 3 4 5 6 7 X . . . . (49) play with one toy or object for 5-10 minutes?
1 2 3 4 5 6 7 X . . . . (50) play with one toy or object for 10 minutes or longer?
1 2 3 4 5 6 7 X . . . . (51) spend time just looking at playthings?
1 2 3 4 5 6 7 X . . . . (52) repeat the same sounds over and over again?
1 2 3 4 5 6 7 X . . . . (53) laugh aloud in play?
1 2 3 4 5 6 7 X . . . . (54) repeat the same movement with an object for 2 minutes or longer (e.g., putting a block in a cup, kicking or hitting a mobile)?
1 2 3 4 5 6 7 X . . . . (55) pay attention to your reading during most of the story when looking at picture books?
1 2 3 4 5 6 7 X . . . . (56) smile or laugh after accomplishing something (e.g., stacking blocks, etc.)?
1 2 3 4 5 6 7 X . . . . (57) smile or laugh when given a toy?
1 2 3 4 5 6 7 X . . . . (58) smile or laugh when tickled?

How often during the last week did the baby enjoy:

1 2 3 4 5 6 7 X . . . . (59) being sung to?
1 2 3 4 5 6 7 X . . . . (60) being read to?
1 2 3 4 5 6 7 X . . . . (61) hearing the sound of words, as in nursery rhymes?
1 2 3 4 5 6 7 X . . . . (62) looking at picture books?
1 2 3 4 5 6 7 X . . . . (63) gentle rhythmic activities, such as rocking or swaying?
1 2 3 4 5 6 7 X . . . . (64) lying quietly and examining his/her fingers or toes?
1 2 3 4 5 6 7 X . . . . (65) being tickled by you or someone else in your family?
1 2 3 4 5 6 7 X . . . . (66) being involved in rambunctious play?
1 2 3 4 5 6 7 X . . . . (67) watching while you, or another adult, playfully made faces?
1 2 3 4 5 6 7 X . . . . (68) touching or lying next to stuffed animals?
1 2 3 4 5 6 7 X . . . . (69) the feel of soft blankets ?
1 2 3 4 5 6 7 X . . . . (70) being rolled up in a warm blanket?
1 2 3 4 5 6 7 X . . . . (71) listening to a musical toy in a crib?

(1) Never	(2) Very Rarely	(3) Less Than Half the Time	(4) About Half the Time	(5) More Than Half the Time	(6) Almost Always	(7) Always	(X) Does Not Apply

When playing quietly with one of her/his favorite toys, how often did your baby:
1 2 3 4 5 6 7 X . . . . (72) show pleasure?
1 2 3 4 5 6 7 X . . . . (73) enjoy lying in the crib for more than 5 minutes?
1 2 3 4 5 6 7 X . . . . (74) enjoy lying in the crib for more than 10 minutes?

When something the baby was playing with had to be removed, how often did s/he:
1 2 3 4 5 6 7 X . . . . (75) cry or show distress for a time?
1 2 3 4 5 6 7 X . . . . (76) seem not bothered?

When tossed around playfully how often did the baby:
1 2 3 4 5 6 7 X . . . . (77) smile?
1 2 3 4 5 6 7 X . . . . (78) laugh?

During a peekaboo game, how often did the baby:
1 2 3 4 5 6 7 X . . . . (79) smile?
1 2 3 4 5 6 7 X . . . . (80) laugh?

How often did your baby enjoy bouncing up and down:
1 2 3 4 5 6 7 X . . . . (81) while on your lap?
1 2 3 4 5 6 7 X . . . . (82) on an object, such as a bed, bouncer chair, or toy?

How often did the infant look up from playing:
1 2 3 4 5 6 7 X . . . . (83) when the telephone rang?
1 2 3 4 5 6 7 X . . . . (84) when s/he heard voices in the next room?

When your baby saw a toy s/he wanted, how often did s/he:
1 2 3 4 5 6 7 X . . . . (85) get very excited about getting it?
1 2 3 4 5 6 7 X . . . . (86) immediately go after it?

When given a new toy, how often did your baby:
1 2 3 4 5 6 7 X . . . . (87) get very excited about getting it?
1 2 3 4 5 6 7 X . . . . (88) immediately go after it?
1 2 3 4 5 6 7 X . . . . (89) seem not to get very excited about it?

Daily Activities

How often during the last week did the baby:
1 2 3 4 5 6 7 X . . . . (90) cry or show distress at a change in parents' appearance, (glasses off, shower cap on, etc.)?
1 2 3 4 5 6 7 X . . . . (91) when in a position to see the television set, look at it for 2 to 5 minutes at a time?

(1) Never	(2) Very Rarely	(3) Less Than Half the Time	(4) About Half the Time	(5) More Than Half the Time	(6) Almost Always	(7) Always	(X) Does Not Apply

How often during the last week did the baby:

1 2 3 4 5 6 7 X . . . . (92) when in a position to see the television set, look at it for 5 minutes or longer?
1 2 3 4 5 6 7 X . . . . (93) protest being placed in a confining place (infant seat, play pen, car seat, etc)?
1 2 3 4 5 6 7 X . . . . (94) startle at a sudden change in body position (for example, when moved suddenly)?
1 2 3 4 5 6 7 X . . . . (95) appear to listen to even very quiet sounds?
1 2 3 4 5 6 7 X . . . . (96) attend to sights or sounds when outdoors (for example, wind chimes or water sprinklers)?
1 2 3 4 5 6 7 X . . . . (97) move quickly toward new objects?
1 2 3 4 5 6 7 X . . . . (98) show a strong desire for something s/he wanted?
1 2 3 4 5 6 7 X . . . . (99) startle to a loud or sudden noise?
1 2 3 4 5 6 7 X . . . . (100) look at children playing in the park or on the playground for 5 minutes or longer?
1 2 3 4 5 6 7 X . . . . (101) watch adults performing household activities (e.g., cooking, etc.) for more than 5 minutes?
1 2 3 4 5 6 7 X . . . . (102) squeal or shout when excited?
1 2 3 4 5 6 7 X . . . . (103) imitate the sounds you made?
1 2 3 4 5 6 7 X . . . . (104) seem excited when you or other adults acted in an excited manner around him/her?

When being held, how often did the baby:

1 2 3 4 5 6 7 X . . . . (105) pull away or kick?
1 2 3 4 5 6 7 X . . . . (106) seem to enjoy him/herself?
1 2 3 4 5 6 7 X . . . . (107) mold to your body?
1 2 3 4 5 6 7 X . . . . (108) squirm?

When placed on his/her back, how often did the baby:

1 2 3 4 5 6 7 X . . . . (109) fuss or protest?
1 2 3 4 5 6 7 X . . . . (110) smile or laugh?
1 2 3 4 5 6 7 X . . . . (111) wave arms and kick?
1 2 3 4 5 6 7 X . . . . (112) squirm and/or turn body?

When the baby wanted something, how often did s/he:

1 2 3 4 5 6 7 X . . . . (113) become upset when s/he could not get what s/he wanted?
1 2 3 4 5 6 7 X . . . . (114) have tantrums (crying, screaming, face red, etc.) when s/he did not get what s/he wanted?

When placed in an infant seat or car seat, how often did the baby:

1 2 3 4 5 6 7 X . . . . (115) wave arms and kick?
1 2 3 4 5 6 7 X . . . . (116) squirm and turn body?
1 2 3 4 5 6 7 X . . . . (117) lie or sit quietly?
1 2 3 4 5 6 7 X . . . . (118) show distress at first; then quiet down?

(1) Never	(2) Very Rarely	(3) Less Than Half the Time	(4) About Half the Time	(5) More Than Half the Time	(6) Almost Always	(7) Always	(X) Does Not Apply

When frustrated with something, how often did your baby:
1 2 3 4 5 6 7 X . . . . (119) calm down within 5 minutes?

When your baby was upset about something, how often did s/he:
1 2 3 4 5 6 7 X . . . . (120) stay upset for up to 10 minutes or longer?
1 2 3 4 5 6 7 X . . . . (121) stay upset for up to 20 minutes or longer?
1 2 3 4 5 6 7 X . . . . (122) soothe her/himself with other things (such as a stuffed animal, or blanket)?

When rocked or hugged, in the last week, how often did your baby:
1 2 3 4 5 6 7 X . . . . (123) seem to enjoy her/himself?
1 2 3 4 5 6 7 X . . . . (124) seemed eager to get away?
1 2 3 4 5 6 7 X . . . . (125) make protesting noises?

When reuniting after having been away during the last week how often did the baby:
1 2 3 4 5 6 7 X . . . . (126) seem to enjoy being held?
1 2 3 4 5 6 7 X . . . . (127) show interest in being close, but resisted being held?
1 2 3 4 5 6 7 X . . . . (128) show distress at being held?

When being carried, in the last week, how often did your baby:
1 2 3 4 5 6 7 X . . . . (129) seem to enjoy him/herself?
1 2 3 4 5 6 7 X . . . . (130) push against you until put down?

While sitting in your lap:
1 2 3 4 5 6 7 X . . . . (131) how often did your baby seem to enjoy her/himself?
1 2 3 4 5 6 7 X . . . . (132) how often would the baby not be content without moving around?

How often did your baby notice:
1 2 3 4 5 6 7 X . . . . (133) low-pitched noises, air conditioner, heating system, or refrigerator running or starting up?
1 2 3 4 5 6 7 X . . . . (134) sirens from fire trucks or ambulances at a distance?
1 2 3 4 5 6 7 X . . . . (135) a change in room temperature?
1 2 3 4 5 6 7 X . . . . (136) a change in light when a cloud passed over the sun?
1 2 3 4 5 6 7 X . . . . (137) sound of an airplane passing overhead?
1 2 3 4 5 6 7 X . . . . (138) a bird or a squirrel up in a tree?
1 2 3 4 5 6 7 X . . . . (139) fabrics with scratchy texture (e.g., wool)?

When tired, how often was your baby:
1 2 3 4 5 6 7 X . . . . (140) likely to cry?
1 2 3 4 5 6 7 X . . . . (141) show distress?

(1) Never	(2) Very Rarely	(3) Less Than Half the Time	(4) About Half the Time	(5) More Than Half the Time	(6) Almost Always	(7) Always	(X) Does Not Apply

At the end of an exciting day, how often did your baby:
1 2 3 4 5 6 7 X . . . . (142) become tearful?
1 2 3 4 5 6 7 X . . . . (143) show distress?

For no apparent reason, how often did your baby:
1 2 3 4 5 6 7 X . . . . (144) appear sad?
1 2 3 4 5 6 7 X . . . . (145) seem unresponsive?

How often did your baby make talking sounds when:
1 2 3 4 5 6 7 X . . . . (146) riding in a car?
1 2 3 4 5 6 7 X . . . . (147) riding in a shopping cart?
1 2 3 4 5 6 7 X . . . . (148) you talked to her/him?

Two Week Time Span

When you returned from having been away and the baby was awake, how often did s/he:
1 2 3 4 5 6 7 X . . . . (149) smile or laugh?

When introduced to an unfamiliar adult, how often did the baby:
1 2 3 4 5 6 7 X . . . . (150) cling to a parent?
1 2 3 4 5 6 7 X . . . . (151) refuse to go to the unfamiliar person?
1 2 3 4 5 6 7 X . . . . (152) hang back from the adult?
1 2 3 4 5 6 7 X . . . . (153) never "warm up" to the unfamiliar adult?

When in the presence of several unfamiliar adults, how often did the baby:
1 2 3 4 5 6 7 X . . . . (154) cling to a parent?
1 2 3 4 5 6 7 X . . . . (155) cry?
1 2 3 4 5 6 7 X . . . . (156) continue to be upset for 10 minutes or longer?

When visiting a new place, how often did the baby:
1 2 3 4 5 6 7 X . . . . (157) show distress for the first few minutes?
1 2 3 4 5 6 7 X . . . . (158) continue to be upset for 10 minutes or more?
1 2 3 4 5 6 7 X . . . . (159) get excited about exploring new surroundings?
1 2 3 4 5 6 7 X . . . . (160) move about actively when s/he is exploring new surroundings?

When your baby was approached by an unfamiliar person when you and s/he were out (for example, shopping), how often did the baby:
1 2 3 4 5 6 7 X . . . . (161) show distress?
1 2 3 4 5 6 7 X . . . . (162) cry?

(1) Never	(2) Very Rarely	(3) Less Than Half the Time	(4) About Half the Time	(5) More Than Half the Time	(6) Almost Always	(7) Always	(X) Does Not Apply

When an unfamiliar adult came to your home or apartment, how often did your baby:
1 2 3 4 5 6 7 X . . . . (163) allow her/himself to be picked up without protest?
1 2 3 4 5 6 7 X . . . . (164) cry when the visitor attempted to pick her/him up?

When in a crowd of people, how often did the baby:
1 2 3 4 5 6 7 X . . . . (165) seem to enjoy him/herself?

Did the baby seem sad when:
1 2 3 4 5 6 7 X . . . . (166) caregiver is gone for an unusually long period of time?
1 2 3 4 5 6 7 X . . . . (167) left alone/unattended in a crib or a playpen for an extended period of time?

When you were busy with another activity, and your baby was not able to get your attention, how often did s/he:
1 2 3 4 5 6 7 X . . . . (168) become sad?
1 2 3 4 5 6 7 X . . . . (169) cry?

When your baby saw another baby crying, how often did s/he:
1 2 3 4 5 6 7 X . . . . (170) become tearful?
1 2 3 4 5 6 7 X . . . . (171) show distress?

When familiar relatives/friends came to visit, how often did your baby:
1 2 3 4 5 6 7 X . . . . (172) get excited?
1 2 3 4 5 6 7 X . . . . (173) seem indifferent?

Soothing Techniques

Have you tried any of the following soothing techniques in the last two weeks? If so, how quickly did your baby soothe using each of these techniques? Circle (X) if you did not try the technique during the LAST TWO WEEKS.

When rocking your baby, how often did s/he:
1 2 3 4 5 6 7 X . . . . (174) soothe immediately?
1 2 3 4 5 6 7 X . . . . (175) not soothe immediately, but in the first two minutes?
1 2 3 4 5 6 7 X . . . . (176) take more than 10 minutes to soothe?

When singing or talking to your baby, how often did s/he:
1 2 3 4 5 6 7 X . . . . (177) soothe immediately?
1 2 3 4 5 6 7 X . . . . (178) not soothe immediately, but in the first two minutes?
1 2 3 4 5 6 7 X . . . . (179) take more than 10 minutes to soothe?

(1) Never	(2) Very Rarely	(3) Less Than Half the Time	(4) About Half the Time	(5) More Than Half the Time	(6) Almost Always	(7) Always	(X) Does Not Apply

When walking with the baby, how often did s/he:
1 2 3 4 5 6 7 X . . . . (180) soothe immediately?
1 2 3 4 5 6 7 X . . . . (181) not soothe immediately, but in the first two minutes?
1 2 3 4 5 6 7 X . . . . (182) take more than 10 minutes to soothe?

When giving him/her a toy, how often did the baby:
1 2 3 4 5 6 7 X . . . . (183) soothe immediately?
1 2 3 4 5 6 7 X . . . . (184) not soothe immediately, but in the first two minutes?
1 2 3 4 5 6 7 X . . . . (185) take more than 10 minutes to soothe?

When showing the baby something to look at, how often did s/he:
1 2 3 4 5 6 7 X . . . . (186) soothe immediately?
1 2 3 4 5 6 7 X . . . . (187) not soothe immediately, but in the first two minutes?
1 2 3 4 5 6 7 X . . . . (188) take more than 10 minutes to soothe?

When patting or gently rubbing some part of the baby's body, how often did s/he:
1 2 3 4 5 6 7 X . . . . (189) soothe immediately?
1 2 3 4 5 6 7 X . . . . (190) not soothe immediately, but in the fist two minutes?
1 2 3 4 5 6 7 X . . . . (191) take more than 10 minutes to soothe?

D.2

Early Childhood Behavior Questionnaire

Early Childhood Behavior Questionnaire (18 months)

RA's name: _____ Child's birth date: Mo:____ Day:____ Yr:____

Date:_____ DCC ID: _____

Subject number: _____ Sex of child (circle one): Male Female

INSTRUCTIONS: **Please read carefully before starting.**
As you read each description of the child's behavior below, please indicate how often the child did this during the last two weeks by circling one of the numbers in the right column. These numbers indicate how often you observed the behavior described **during the last two weeks.**

never	very rarely	less than half the time	about half the time	more than half the time	almost always	always	does not apply
1	2	3	4	5	6	7	NA

The "Does Not Apply" column (NA) is used when you did not see the child in the situation described during the last two weeks. For example, if the situation mentions the child going to the doctor and there was no time during the last two weeks when the child went to the doctor, circle the (NA) column. "Does Not Apply" (NA) is different from "NEVER" (1). "Never" is used when you saw the child in the situation but the child never engaged in the behavior mentioned in the last two weeks. Please be sure to circle a number or NA for every item.

When told that it was time for bed or a nap, how often did your child

1.	react with anger?	1	2	3	4	5	6	7 NA
2.	get irritable?	1	2	3	4	5	6	7 NA

When approached by an unfamiliar person in a public place (for example, the grocery store), how often did your child

3.	remain calm?	1	2	3	4	5	6	7 NA
4.	pull back and avoid the person?	1	2	3	4	5	6	7 NA
5.	cling to a parent?	1	2	3	4	5	6	7 NA

During everyday activities, how often did your child

6.	startle at loud noises (such as a fire engine siren)?	1	2	3	4	5	6	7 NA
7.	tap or drum with fingers on tables or other objects?	1	2	3	4	5	6	7 NA
8.	get irritated by scratchy sounds?	1	2	3	4	5	6	7 NA
9.	become uncomfortable when his/her socks were not aligned properly on his/her feet?	1	2	3	4	5	6	7 NA

After getting a bump or scrape, how often did your child

10.	forget about it in a few minutes?	1	2	3	4	5	6	7 NA

While playing outdoors, how often did your child

11.	like making lots of noise?	1	2	3	4	5	6	7 NA
12.	enjoy sitting quietly in the sunshine?	1	2	3	4	5	6	7 NA
13.	want to climb to high places (for example, up a tree or on the jungle gym)?	1	2	3	4	5	6	7 NA

never	very rarely	less than half the time	about half the time	more than half the time	almost always	always	does not apply
1	2	3	4	5	6	7	NA

During the last two weeks:

When s/he was carried, how often did your child

14. like to be held? 1 2 3 4 5 6 7 NA
15. push against you until put down? 1 2 3 4 5 6 7 NA
16. squirm? 1 2 3 4 5 6 7 NA
17. struggle to get away? 1 2 3 4 5 6 7 NA
18. snuggle up next to you? 1 2 3 4 5 6 7 NA

While having trouble completing a task (e.g., building, drawing, dressing), how often did your child

19. get easily irritated? 1 2 3 4 5 6 7 NA
20. become sad? 1 2 3 4 5 6 7 NA

When a familiar child came to your home, how often did your child

21. engage in an activity with the child? 1 2 3 4 5 6 7 NA
22. seek out the company of the child? 1 2 3 4 5 6 7 NA

When offered a choice of activities, how often did your child

23. stop and think before deciding? 1 2 3 4 5 6 7 NA
24. decide what to do very quickly and go after it? 1 2 3 4 5 6 7 NA
25. seem slow and unhurried about what to do next? 1 2 3 4 5 6 7 NA

When asked NOT to, how often did your child

26. run around your house or apartment anyway? 1 2 3 4 5 6 7 NA
27. touch an attractive item (such as an ornament) anyway? 1 2 3 4 5 6 7 NA
28. play with something anyway? 1 2 3 4 5 6 7 NA

During daily or evening quiet time with you and your child, how often did your child

29. enjoy just being quietly sung to? 1 2 3 4 5 6 7 NA
30. smile at the sound of words, as in nursery rhymes? 1 2 3 4 5 6 7 NA
31. enjoy just being talked to? 1 2 3 4 5 6 7 NA
32. enjoy rhythmic activities, such as rocking or swaying? 1 2 3 4 5 6 7 NA

During everyday activities, how often did your child

33. become distressed when his/her hands were dirty and/or sticky? 1 2 3 4 5 6 7 NA
34. notice that material was very soft (cotton) or rough (wool)? 1 2 3 4 5 6 7 NA
35. notice low-pitched noises such as the air-conditioner, heater, or refrigerator running or starting up? 1 2 3 4 5 6 7 NA
36. blink a lot? 1 2 3 4 5 6 7 NA
37. get very enthusiastic about the things s/he was going to do? 1 2 3 4 5 6 7 NA

never 1	very rarely 2	than half the time 3	less half the time 4	about than half the time 5	more almost always 6	always 7	does not apply NA

During the last two weeks:

<u>While at home, how often did your child</u>

38. show fear at a loud sound (blender, vacuum cleaner, etc.)? 1 2 3 4 5 6 7 NA
39. seem afraid of the dark? 1 2 3 4 5 6 7 NA

<u>When visiting the home of a familiar adult, such as a relative or friend, how often did your child</u>

40. want to interact with the adult? 1 2 3 4 5 6 7 NA

<u>While bathing, how often did your child</u>

41. sit quietly? 1 2 3 4 5 6 7 NA
42. splash, kick, or try to jump? 1 2 3 4 5 6 7 NA

<u>While playing outdoors, how often did your child</u>

43. look immediately when you pointed at something? 1 2 3 4 5 6 7 NA
44. choose to take chances for the fun and excitement of it? 1 2 3 4 5 6 7 NA
45. <u>not</u> like going down high slides at the amusement park or playground? 1 2 3 4 5 6 7 NA

<u>When s/he was upset, how often did your child</u>

46. change to feeling better within a few minutes? 1 2 3 4 5 6 7 NA
47. soothe only with difficulty? 1 2 3 4 5 6 7 NA
48. stay upset for 10 minutes or longer? 1 2 3 4 5 6 7 NA

<u>When engaged in play with his/her favorite toy, how often did your child</u>

49. play for 5 minutes or less? 1 2 3 4 5 6 7 NA
50. play for more than 10 minutes? 1 2 3 4 5 6 7 NA
51. continue to play <u>while at the same time</u> responding to your remarks or questions? 1 2 3 4 5 6 7 NA

<u>When approaching unfamiliar children playing, how often did your child</u>

52. watch rather than join? 1 2 3 4 5 6 7 NA
53. approach slowly? 1 2 3 4 5 6 7 NA
54. seem uncomfortable? 1 2 3 4 5 6 7 NA

never	very rarely	less than half the time	about half the time	more than half the time	almost always	always	does not apply
1	2	3	4	5	6	7	NA

During the last two weeks:

<u>During everyday activities, how often did your child</u>

55. complain about odors on others, such as perfume?	1	2	3	4	5	6	7	NA
56. seem to be bothered by bright light?	1	2	3	4	5	6	7	NA
57. move quickly from one place to another?	1	2	3	4	5	6	7	NA
58. notice the smoothness or roughness of objects s/he touched?	1	2	3	4	5	6	7	NA
59. become sad or blue for no apparent reason?	1	2	3	4	5	6	7	NA

<u>After having been interrupted, how often did your child</u>

60. return to a previous activity?	1	2	3	4	5	6	7	NA
61. have difficulty returning to the previous activity?	1	2	3	4	5	6	7	NA

<u>While watching TV or hearing a story, how often did your child</u>

62. seem frightened by 'monster' characters?	1	2	3	4	5	6	7	NA

<u>When you suggested an outdoor activity that s/he really likes, how often did your child</u>

63. respond immediately?	1	2	3	4	5	6	7	NA
64. run to the door before getting ready?	1	2	3	4	5	6	7	NA

<u>When told that loved adults would visit, how often did your child</u>

65. get very excited?	1	2	3	4	5	6	7	NA
66. become very happy?	1	2	3	4	5	6	7	NA

<u>When taking a quiet, warm bath, how often did your child</u>

67. seem to relax and enjoy him/herself?	1	2	3	4	5	6	7	NA

<u>When s/he couldn't find something to play with, how often did your child</u>

68. get angry?	1	2	3	4	5	6	7	NA

<u>During sleep, how often did your child</u>

69. toss about in the bed?	1	2	3	4	5	6	7	NA
70. sleep in one position only?	1	2	3	4	5	6	7	NA

<u>During quiet activities, such as reading a story, how often did your child</u>

71. swing or tap his/her foot?	1	2	3	4	5	6	7	NA
72. fiddle with his/her hair, clothing, etc.?	1	2	3	4	5	6	7	NA
73. show repeated movements like squinting, hunching up the shoulders, or twitching the facial muscles?	1	2	3	4	5	6	7	NA

never	very rarely	less than half the time	about half the time	more than half the time	almost always	always	does not apply
1	2	3	4	5	6	7	NA

During the last two weeks:

<u>While playing indoors, how often did your child</u>

74. like rough and rowdy games?	1	2	3	4	5	6	7	NA
75. enjoy playing boisterous games like 'chase'?	1	2	3	4	5	6	7	NA
76. enjoy vigorously jumping on the couch or bed?	1	2	3	4	5	6	7	NA

<u>In situations where s/he is meeting new people, how often did your child</u>

77. turn away?	1	2	3	4	5	6	7	NA
78. become quiet?	1	2	3	4	5	6	7	NA
79. seem comfortable?	1	2	3	4	5	6	7	NA

<u>When being gently rocked or hugged, how often did your child</u>

80. seem eager to get away?	1	2	3	4	5	6	7	NA
81. make protesting noises?	1	2	3	4	5	6	7	NA

<u>When encountering a new activity, how often did your child</u>

82. sit on the sidelines and observe before joining in?	1	2	3	4	5	6	7	NA
83. get involved immediately?	1	2	3	4	5	6	7	NA

<u>When visiting the home of a familiar child, how often did your child</u>

84. engage in an activity with the child?	1	2	3	4	5	6	7	NA
85. seek out the company of the child?	1	2	3	4	5	6	7	NA

<u>When another child took away his/her favorite toy, how often did your child</u>

86. scream with anger?	1	2	3	4	5	6	7	NA
87. <u>not</u> become angry?	1	2	3	4	5	6	7	NA
88. sadly cry?	1	2	3	4	5	6	7	NA
89. <u>not</u> react with sadness?	1	2	3	4	5	6	7	NA

<u>When engaged in an activity requiring attention, such as building with blocks, how often did your child</u>

90. move quickly to another activity?	1	2	3	4	5	6	7	NA
91. stay involved for 10 minutes or more?	1	2	3	4	5	6	7	NA
92. tire of the activity relatively quickly?	1	2	3	4	5	6	7	NA

<u>During everyday activities, how often did your child</u>

93. pay attention to you right away when you called to him/her?	1	2	3	4	5	6	7	NA
94. seem to be disturbed by loud sounds?	1	2	3	4	5	6	7	NA
95. stop going after a forbidden object (such as a VCR) when you used a toy to distract her/him?	1	2	3	4	5	6	7	NA
96. notice small things, such as dirt or a stain, on his/her clothes?	1	2	3	4	5	6	7	NA

never 1	very rarely 2	less than half the time 3	about half the time 4	more than half the time 5	almost always 6	always 7	does not apply NA

During the last two weeks:

<u>While in a public place, how often did your child</u>

97. seem uneasy about approaching an elevator or escalator?.....1 2 3 4 5 6 7 NA
98. cry or show distress when approached by an unfamiliar animal?.....1 2 3 4 5 6 7 NA
99. seem afraid of large, noisy vehicles?.....1 2 3 4 5 6 7 NA
100. show fear when the caregiver stepped out of sight?.....1 2 3 4 5 6 7 NA

<u>When playing outdoors with other children, how often did your child</u>

101. seem to be one of the most active children?.....1 2 3 4 5 6 7 NA
102. sit quietly and watch?.....1 2 3 4 5 6 7 NA

<u>During daily or evening quiet time with you and your child, how often did your child</u>

103. want to be cuddled?.....1 2 3 4 5 6 7 NA

<u>During everyday activities, how often did your child</u>

104. seem frightened for no apparent reason?.....1 2 3 4 5 6 7 NA
105. seem to be irritated by tags in his/her clothes?.....1 2 3 4 5 6 7 NA
106. notice when you were wearing new clothing?.....1 2 3 4 5 6 7 NA
107. react to beeping sounds (such as when the microwave or oven is done cooking)?.....1 2 3 4 5 6 7 NA
108. show repeated movements like squinting, hunching up the shoulders, or twitching the facial muscles?.....1 2 3 4 5 6 7 NA

<u>When being dressed or undressed, how often did your child</u>

109. squirm and try to get away?.....1 2 3 4 5 6 7 NA
110. stay still?.....1 2 3 4 5 6 7 NA

<u>When told "no", how often did your child</u>

111. stop an activity quickly?.....1 2 3 4 5 6 7 NA
112. stop the forbidden activity?.....1 2 3 4 5 6 7 NA
113. ignore your warning?.....1 2 3 4 5 6 7 NA
114. become sadly tearful?.....1 2 3 4 5 6 7 NA

<u>Following an exciting activity or event, how often did your child</u>

115. calm down quickly?.....1 2 3 4 5 6 7 NA
116. have a hard time settling down?.....1 2 3 4 5 6 7 NA
117. seem to feel down or blue?.....1 2 3 4 5 6 7 NA
118. become sadly tearful?.....1 2 3 4 5 6 7 NA

never	very rarely	less than half the time	about half the time	more than half the time	almost always	always	does not apply
1	2	3	4	5	6	7	NA

During the last two weeks:

When given something to eat that s/he didn't like, how often did your child

117. become angry?.....1 2 3 4 5 6 7 NA

During everyday activities, how often did your child seem able to

118. easily shift attention from one activity to another?.....1 2 3 4 5 6 7 NA
119. do more than one thing at a time (such as playing with a toy while watching TV)?.....1 2 3 4 5 6 7 NA

While playing indoors, how often did your child

120. run through the house?.....1 2 3 4 5 6 7 NA
121. climb over furniture?.....1 2 3 4 5 6 7 NA
122. not care for rough and rowdy games?.....1 2 3 4 5 6 7 NA
123. enjoy activities such as being spun, etc.?.....1 2 3 4 5 6 7 NA

When playing alone, how often did your child

124. become easily distracted?.....1 2 3 4 5 6 7 NA
125. play with a set of objects for 5 minutes or longer at a time?.....1 2 3 4 5 6 7 NA
126. scratch him/herself?.....1 2 3 4 5 6 7 NA
127. tear materials close at hand?.....1 2 3 4 5 6 7 NA

Before an exciting event (such as receiving a new toy), how often did your child

128. get so worked up that s/he had trouble sitting still?.....1 2 3 4 5 6 7 NA
129. get very excited about getting it?.....1 2 3 4 5 6 7 NA
130. remain pretty calm?.....1 2 3 4 5 6 7 NA
131. seem eager to have it right away?.....1 2 3 4 5 6 7 NA

When s/he asked for something and you said "no", how often did your child

132. become frustrated?.....1 2 3 4 5 6 7 NA
133. protest with anger?.....1 2 3 4 5 6 7 NA
134. have a temper tantrum?.....1 2 3 4 5 6 7 NA
135. become sad?.....1 2 3 4 5 6 7 NA

While playing or walking outdoors, how often did your child

136. notice sights or sounds (for example, wind chimes or water sprinklers)?.....1 2 3 4 5 6 7 NA
137. notice flying or crawling insects?.....1 2 3 4 5 6 7 NA

never	very rarely	less than half the time	about half the time	more than half the time	almost always	always	does not apply
1	2	3	4	5	6	7	NA

During the last two weeks:

When you gave your child an attractive toy, how often did your child

138. grab the object as soon as it was set down? 1 2 3 4 5 6 7 NA
139. look the object over before touching it? 1 2 3 4 5 6 7 NA

When asked to wait for a desirable item (such as ice cream), how often did your child

140. seem unable to wait for as long as 1 minute? 1 2 3 4 5 6 7 NA
141. go after it anyway? 1 2 3 4 5 6 7 NA
142. wait patiently? 1 2 3 4 5 6 7 NA
143. whimper and cry? 1 2 3 4 5 6 7 NA

When being gently rocked, how often did your child

144. smile? 1 2 3 4 5 6 7 NA
145. make sounds of pleasure? 1 2 3 4 5 6 7 NA

While visiting relatives or adult family friends s/he sees infrequently, how often did your child

146. stay back and avoid eye contact? 1 2 3 4 5 6 7 NA
147. hide his/her face? 1 2 3 4 5 6 7 NA
148. "warm up" to the person within a few minutes? 1 2 3 4 5 6 7 NA

When you removed something s/he should not have been playin with, how often did your child

149. become sad? 1 2 3 4 5 6 7 NA

During everyday activities, how often did your child

150. become bothered by sounds while in noisy environments? 1 2 3 4 5 6 7 NA
151. become bothered by scratchy materials like wool? 1 2 3 4 5 6 7 NA
152. notice changes in your appearance (such as wet hair, a hat, or jewelry)? 1 2 3 4 5 6 7 NA
153. appear to listen to even very quiet sounds? 1 2 3 4 5 6 7 NA
154. seem full of energy, even in the evening? 1 2 3 4 5 6 7 NA

When interrupted during a favorite TV show, how often did your child

155. immediately return to watching the TV program? 1 2 3 4 5 6 7 NA
156. not finish watching the program? 1 2 3 4 5 6 7 NA

never 1	very rarely 2	less than half the time 3	about half the time 4	more than half the time 5	almost always 6	always 7	does not apply NA

During the last two weeks:

While being held on your lap, how often did your child

157. pull away and kick? 1 2 3 4 5 6 7 NA
158. seem to enjoy him/herself? 1 2 3 4 5 6 7 NA
159. mold to your body? 1 2 3 4 5 6 7 NA
160. seek hugs and kisses? 1 2 3 4 5 6 7 NA

While a story was being read to your child, how often did s/he

161. enjoy listening to the story? 1 2 3 4 5 6 7 NA

When hearing about a future family outing (such as a trip to the playground), how often did your child

162. become very enthusiastic? 1 2 3 4 5 6 7 NA
163. look forward to it? 1 2 3 4 5 6 7 NA
164. remain pretty calm? 1 2 3 4 5 6 7 NA

While looking at picture books on his/her own, how often did your child

165. stay interested in the book for 5 minutes or less? 1 2 3 4 5 6 7 NA
166. stay interested in the book for more than 10 minutes at a time? 1 2 3 4 5 6 7 NA
167. become easily distracted? 1 2 3 4 5 6 7 NA
168. enjoy looking at the books? 1 2 3 4 5 6 7 NA

When tired after a long day of activities, how often did your child

169. become easily frustrated? 1 2 3 4 5 6 7 NA

When a familiar adult, such as a relative or friend, visited your home, how often did your child

170. want to interact with the adult? 1 2 3 4 5 6 7 NA

When asked to do so, how often was your child able to

171. stop an ongoing activity? 1 2 3 4 5 6 7 NA
172. lower his or her voice? 1 2 3 4 5 6 7 NA
173. be careful with something breakable? 1 2 3 4 5 6 7 NA

When visiting a new place, how often did your child

174. not want to enter? 1 2 3 4 5 6 7 NA
175. go right in? 1 2 3 4 5 6 7 NA

While you were showing your child how to do something, how often did your child

176. jump into the task before it was fully explained? 1 2 3 4 5 6 7 NA

never	very rarely	less than half the time	about half the time	more than half the time	almost always	always	does not apply
1	2	3	4	5	6	7	NA

During the last two weeks:

While you were talking with someone else, how often did your child

177. easily switch attention from speaker to speaker? 1 2 3 4 5 6 7 NA

During everyday activities, how often did your child

178. become irritated when his/her clothes were tight? 1 2 3 4 5 6 7 NA
179. notice smells from cooking? 1 2 3 4 5 6 7 NA
180. rock back and forth while sitting? 1 2 3 4 5 6 7 NA
181. notice sirens from fire trucks or ambulances at a distance? 1 2 3 4 5 6 7 NA

When you mildly criticized or corrected her/his behavior, how often did your child

182. get mad? 1 2 3 4 5 6 7 NA
183. have hurt feelings? 1 2 3 4 5 6 7 NA

When s/he was upset, how often did your child

184. cry for more than 3 minutes, even when being comforted? 1 2 3 4 5 6 7 NA
185. cheer up within a minute or two when being comforted? 1 2 3 4 5 6 7 NA
186. become easily soothed? 1 2 3 4 5 6 7 NA

When you were busy, how often did your child

187. find another activity to do when asked? 1 2 3 4 5 6 7 NA

While playing outdoors, how often did your child

188. want to jump from heights? 1 2 3 4 5 6 7 NA
189. want to go down the slide in unusual ways (for example, head first)? 1 2 3 4 5 6 7 NA
190. enjoy being pushed fast on a wheeled vehicle? 1 2 3 4 5 6 7 NA
191. enjoy sitting down and playing quietly? 1 2 3 4 5 6 7 NA

When playing alone, how often did your child

192. chew his/her lower lip? 1 2 3 4 5 6 7 NA
193. stick out his/her tongue when concentrating? 1 2 3 4 5 6 7 NA
194. move from one task or activity to another without completing any? 1 2 3 4 5 6 7 NA
195. have trouble focusing on a task without guidance? 1 2 3 4 5 6 7 NA

When given a wrapped present, how often did your child

196. become extremely animated? 1 2 3 4 5 6 7 NA

never	very rarely	less than half the time	about half the time	more than half the time	almost always	always	does not apply
1	2	3	4	5	6	7	NA

During the last two weeks:

When around large gatherings of familiar adults or children, how often did your child

197. want to be involved in a group activity?.....1 2 3 4 5 6 7 NA

198. enjoy playing with a number of different people?.....1 2 3 4 5 6 7 NA

When s/he was asked to share his/her toys, how often did your child

199. become sad?.....1 2 3 4 5 6 7 NA

D.3

Infant-Toddler Social and Emotional Assessment

BUBBLEFORM INSTRUCTIONS
Completely fill in the bubbles using a dark pen or pencil:
Like this: ● Not like this: ✓ Ⓧ /
If you make a mistake either completely erase your mark
OR cross out the wrong answer with an X:

Place Barcode Here

Subject No: _____ **DCCID:** _____

RA Name: _____ **Date:** _____

Infant-Toddler Assessment (ITSEA) -18 months -

Not true / Rarely	Somewhat true / Sometimes	Very true/Often	Does Not Apply
⓪	①	②	Ⓧ

SECTION A

(1)

a) Is restless and can't sit still.	⓪	①	②	Ⓧ
b) Gets very "wound up" or silly when playing.	⓪	①	②	Ⓧ
c) Is constantly moving.	⓪	①	②	Ⓧ
d) Seems to be driven by a motor.	⓪	①	②	Ⓧ
e) Is very loud. Shouts and screams a lot.	⓪	①	②	Ⓧ
f) Goes from toy to toy faster than other children his/her age.	⓪	①	②	Ⓧ
g) Gets hurt more than other children.	⓪	①	②	Ⓧ
h) Gets hurt so often that you can hardly take your eyes off him/her.	⓪	①	②	Ⓧ

(2)

a) Acts aggressive when frustrated.	⓪	①	②	Ⓧ
b) Acts bossy.	⓪	①	②	Ⓧ
c) Misbehaves to get attention from adults.	⓪	①	②	Ⓧ
d) Is disobedient or defiant.	⓪	①	②	Ⓧ
e) Is sneaky. Hides misbehavior.	⓪	①	②	Ⓧ
f) Is "hard to handle".	⓪	①	②	Ⓧ
g) Is stubborn.	⓪	①	②	Ⓧ
h) Has a short fuse. Gets mad easily.	⓪	①	②	Ⓧ
i) Hits, shoves, kicks or bites children or adults.	⓪	①	②	Ⓧ
j) Is aggressive with you (or other parent).	⓪	①	②	Ⓧ
k) Has temper tantrums.	⓪	①	②	Ⓧ
l) Throws or pushes away the things s/he does not want.	⓪	①	②	Ⓧ

BUBBLEFORM INSTRUCTIONS
Completely fill in the bubbles using a dark pen or pencil:
Like this: ● Not like this: ⊘ ⊗ ⊘
If you make a mistake either completely erase your mark OR cross out the wrong answer with an X:

Place Barcode Here

(3)

a) Fights with other children.	0	1	2	X
b) Is mean with other children on purpose.	0	1	2	X
c) "Tests" other children to see if they will get angry.	0	1	2	X
d) Hurts other children on purpose.	0	1	2	X
e) Picks on or bullies other children.	0	1	2	X
f) Takes toys away from other children.	0	1	2	X
g) Tries to get other children mad or upset.	0	1	2	X
h) Teases other children.	0	1	2	X

(4)

a) Often gets very upset.	0	1	2	X
b) Is impatient or easily frustrated.	0	1	2	X
c) Cries a lot.	0	1	2	X
d) Is irritable or grouchy.	0	1	2	X
e) Gets angry or pouts.	0	1	2	X

SECTION B

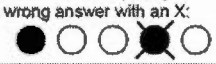
(5)

a) Takes a while to feel comfortable in new places (10 minutes or more).	0	1	2	X
b) Hangs on you or wants to be in your lap when with other people.	0	1	2	X
c) Is very clingy.	0	1	2	X
d) Is shy with new people.	0	1	2	X
e) Is shy with new children.	0	1	2	X
f) Gets upset when left with a new baby-sitter.	0	1	2	X
g) Gets upset when left with a familiar babysitter or relative.	0	1	2	X
h) Cries or hangs onto you when you try to leave.	0	1	2	X

(6)

a) "Spaces out". Is totally unaware of what's happening around him/her	0	1	2	X
b) Does not make eye contact.	0	1	2	X
c) Avoids physical contact.	0	1	2	X
d) Keeps feelings to self.	0	1	2	X

BUBBLEFORM INSTRUCTIONS
Completely fill in the bubbles using a dark pen or pencil:
Like this: ● Not like this: ✓ Ⓧ /
If you make a mistake either completely erase your mark
OR cross out the wrong answer with an X:



Place Barcode Here

e) Laughs and smiles less than other children.	0	1	2	X
f) Has less fun than other children.	0	1	2	X
g) Looks unhappy or sad without any reason.	0	1	2	X
h) Seems withdrawn.	0	1	2	X
i) Seems very unhappy, sad or depressed.	0	1	2	X

SECTION C

(7)

a) Usually sleeps through the night.	0	1	2	X
b) Avoids going to bed at night.	0	1	2	X
c) Has trouble falling asleep or staying asleep.	0	1	2	X
d) Strongly resists going down for a nap (N: no longer needs naps).	0	1	2	X
e) Wakes up screaming and does not respond to you for a few minutes (night terrors).	0	1	2	X
f) Wakes up from scary dreams or nightmares.	0	1	2	X

(8)

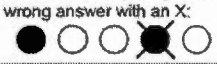
a) Is a good eater.	0	1	2	X
b) Refuses to eat.	0	1	2	X
c) Is a picky eater.	0	1	2	X
d) Accepts new foods right away.	0	1	2	X

SECTION D

(9)

a) Has very strange habits.	0	1	2	X
b) Is very worried about getting dirty.	0	1	2	X
c) Worries about own body.	0	1	2	X
d) Repeats the same action over & over again.	0	1	2	X
e) Needs things to be clean or neat.	0	1	2	X
f) Puts things in a special order over and over again.	0	1	2	X
g) "Spaces out." Is totally unaware of what's happening around him/her.	0	1	2	X
h) Swears.	0	1	2	X

BUBBLEFORM INSTRUCTIONS
Completely fill in the bubbles using a dark pen or pencil:
Like this: ● Not like this: ⊘ ⊗ ⊘
If you make a mistake either completely erase your mark
OR cross out the wrong answer with an X:



Place Barcode Here

i) Talks about things that are strange, scary or disgusting.	⓪	①	②	ⓧ
j) Is destructive. Breaks or ruins things on purpose.	⓪	①	②	ⓧ
k) Repeats a particular movement over and over (e.g., rocking, spinning).	⓪	①	②	ⓧ
l) Does not make eye contact.	⓪	①	②	ⓧ
m) Gets confused about what is real and what is make believe.	⓪	①	②	ⓧ

SECTION E

(10)

a) Looks at things for a minute or longer.	⓪	①	②	ⓧ
b) Plays with toys for 5 minutes or more.	⓪	①	②	ⓧ
c) Plays by him/herself for 10 minutes or more.	⓪	①	②	ⓧ
d) Can sit for 5 minutes while you read a story.	⓪	①	②	ⓧ
e) Can pay attention for a long time. (Not including TV).	⓪	①	②	ⓧ

(11)

a) Follows rules.	⓪	①	②	ⓧ
b) Tries to do as you ask.	⓪	①	②	ⓧ
c) Is well-behaved.	⓪	①	②	ⓧ
d) Is easy to take care of.	⓪	①	②	ⓧ
e) Stays still while being changed, dressed or bathed.	⓪	①	②	ⓧ

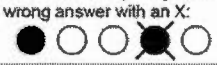
(12)

a) Takes turns when playing with others.	⓪	①	②	ⓧ
b) Is liked by other children.	⓪	①	②	ⓧ
c) Plays well with other children.	⓪	①	②	ⓧ
d) Usually plays what other children want to play.	⓪	①	②	ⓧ
e) Really wants to please other children.	⓪	①	②	ⓧ
f) Shares toys and other things.	⓪	①	②	ⓧ
g) Has at least one favorite friend (a child).	⓪	①	②	ⓧ

(13)

a) Laughs easily or a lot.	⓪	①	②	ⓧ
b) Is affectionate with loved ones.	⓪	①	②	ⓧ
c) Smiles a lot.	⓪	①	②	ⓧ

BUBBLEFORM INSTRUCTIONS
Completely fill in the bubbles using a dark pen or pencil:
Like this: ● Not like this: ✓ Ⓧ /
If you make a mistake either completely erase your mark
OR cross out the wrong answer with an X:



Place Barcode Here

(14)

a) Is worried or upset when children cry.	⓪	①	②	Ⓧ
b) Tries to make you feel better when you are upset.	⓪	①	②	Ⓧ
c) Is worried or upset when someone is hurt.	⓪	①	②	Ⓧ
d) Tries to help when someone is hurt. For example, gives a toy.	⓪	①	②	Ⓧ
e) Gives you things to make you happy.	⓪	①	②	Ⓧ

(15) (2 years-old only)

a) Talks about own feelings. For example, says "I'm mad".	⓪	①	②	Ⓧ
b) Talks about other people's feelings (like "Mommy is mad").	⓪	①	②	Ⓧ
c) Is aware of other people's feelings.	⓪	①	②	Ⓧ

(16) (2 years-old only)

a) Wants to do things for self.	⓪	①	②	Ⓧ
b) Is curious about new things.	⓪	①	②	Ⓧ
c) Likes figuring things out, like stacking blocks.	⓪	①	②	Ⓧ
d) Enjoys challenging activities.	⓪	①	②	Ⓧ

D.4

Peabody Picture Vocabulary Test-Revised

Échelle de vocabulaire en images Peabody

Adaptation française du Peabody Picture Vocabulary Test – Revised

Lloyd M. Dunn, Claudia M. Thériault-Whalen, et Leota M. Dunn

FORME A

EVIP

FEUILLE DE RÉPONSE

NOM _____ SEXE : M_____ F_____
nom de famille prénom initiale

LANGUE MATERNELLE : _____ Français_____ Autre (spécifier) _____

ADRESSE DES PARENTS (GARDIENS) : _____

_____ Téléphone _____

CLASSE _____ ÉCOLE _____

ENSEIGNANT(E) _____ Examinateur(trice) : _____

J-1	F-2	M-3	A-4	M-5	J-6	J-7	A-8	S-9	O-10	N-11	D-12

Utiliser l'aide-mémoire ci-haut pour calculer l'âge du sujet.

Calcul de l'âge chronologique

	Année	Mois	Jour
Date du test	_____	_____	_____
Date de naissance	_____	_____	_____
Âge chronologique	_____	_____	_____

Quand le nombre de jours est de 15 ou plus, on ajoute 1 mois à l'âge.

OBSERVATIONS : Cocher ou indiquer :

- _____ Appareil auditif
- _____ Droitier
- _____ S'approche des images
- _____ Paralysie
- _____ Besoin de directives
- _____ Difficulté d'expression
- _____ Compéhension des consignes
- _____ Distraction durant le test
- _____ Lunettes
- _____ Gaucher
- _____ Tremblement
- _____ Fait répéter
- _____ Réservé

AUTRES OBSERVATIONS : _____

_____

MOTIF DE L'EXAMEN : _____

_____

_____

Durée de l'administration : **Début :** _____ : _____ **Fin :** _____ : _____ = _____

PSYCAN

ÉDITION DE : PSYCAN. Case Postale 290, Succursale V, Toronto (Ontario) M6R 3A5

IMPRIMÉ AU CANADA

FEUILLE DE RÉPONSE

Prénom : _____

Administration des items d'entraînement

POUR LA PLUPART DES SUJETS DE 8 ANS ET MOINS :
Utiliser les planche A, B et C. Ne faire passer que le nombre de séries nécessaire à l'obtention de trois bonnes réponses consécutives.

Planche	Série W	Série X	Série Y	Série Z
A	poupée (4) ✓	fourchette (1)	table (2)	automobile (3)
B	homme (2) ✓	peigne (3)	chaussette (4)	bouche (1)
C	se balancer (3)	boire (4)	marcher (1)	grimper (2)
D	roue (4)	formolure éclair (2)	câble (1)	râteau (3)
E	géant (1)	mariée (3)	sorcière (4)	royal (2)

Pour plus de détails, voir le manuel.

POUR LA PLUPART DES SUJETS DE 8 ANS ET PLUS :
Utiliser les planches D et E. Ne faire passer que le nombre de séries nécessaire à l'obtention de trois bonnes réponses consécutives.

POINTS DE DÉPART
Le point de départ pour les sujets d'habileté moyenne apparaît dans la colonne Âge. Les numéros encerclés sont placés près de l'item de départ pour tous les sujets dans un intervalle d'âge de 6 ou 12 mois. Par exemple, le point de départ pour les sujets allant de 2-6 ans à 3-5 ans est l'item 1; l'item 15 est le point de départ pour les sujets de 3-6 à 3-11 ans; et l'item 120, pour les sujets de 16-0 ans et plus. Pour les points de départ pour les sujets faibles ou excellents, voir la partie 2 du Manuel.

RÈGLES DE LA BASE ET DU PLAFOND

BASE : Plus haute série de 8 bonnes réponses consécutives.
PLAFOND : Plus basse série de 8 réponses consécutives contenant 6 échecs.

Pour plus de détails, voir le manuel.

NOTATION DES RÉPONSES ET DES ÉCHECS

On notera la réponse donnée par le sujet (1, 2, 3 ou 4) à chacun des items administrés. Pour chaque échec tracer une diagonale à travers la figure qui suit la réponse du sujet tel qu'indiqué ci-dessous :

1 bateau (2) 4 Ø

La série de 8 figures de la colonne Échec est répétée afin de faciliter le repérage de la base et du plafond, et ainsi réduire les fautes de notation.

ITEMS DE L'ÉCHELLE, RÉPONSES, CODE DE NOTATION ET ÉCHECS

Âge	Planche		Mot	Code	Réponse	Échec
2½	3	1	bateau	(2)	____	○
		2	autobus	(4)	____	□
		3	main	(1)	____	△
		4	tracteur	(2)	____	∩
		5	lit	(3)	____	♡
		6	accident	(2)	____	☆
		7	tambour	(3)	____	◇
		8	vache	(1)	____	○
		9	serpent	(4)	____	□
		10	lampe	(4)	____	△
		11	genou	(2)	____	∩
		12	plume	(1)	____	♡
		13	pingouin	(1)	____	☆
		14	clôture	(4)	____	◇
3½		15	parachute	(3)	____	○
		16	flèche	(2)	____	□
		17	carré	(4)	____	△
		18	filet	(2)	____	∩
		19	outil	(4)	____	♡
4		20	légume	(4)	____	☆
		21	coude	(3)	____	◇
		22	bandage	(4)	____	○
		23	déchirer	(4)	____	□
		24	fôret	(3)	____	△
4½		25	mesurer	(2)	____	∩
		26	enveloppe	(2)	____	♡
		27	hélicoptère	(1)	____	☆
		28	pneu	(3)	____	◇
		29	vide	(3)	____	○
5		30	nid	(1)	____	□
		31	cage	(1)	____	△
		32	griffe	(4)	____	∩
		33	s'étirer	(1)	____	♡
		34	attacher	(2)	____	☆
5½		35	flatter	(1)	____	◇
		36	coller	(4)	____	○
		37	coudre	(2)	____	□
		38	gonflé	(3)	____	△
		39	épaule	(3)	____	∩
		40	cadre	(1)	____	♡
		41	décoré	(3)	____	☆
		42	tige	(3)	____	◇
		43	tambourin	(1)	____	○
		44	repasseuse	(1)	____	□
6		45	robinet	(2)	____	△
		46	voile	(1)	____	∩
		47	narine	(1)	____	♡
		48	signal	(3)	____	☆
		49	surpris	(4)	____	◇
		50	groupe	(3)	____	○
		51	remplir	(1)	____	□
		52	peler	(3)	____	△
		53	dispute	(1)	____	∩
		54	plonger	(2)	____	♡
7		55	livrer	(1)	____	☆
		56	démolir	(4)	____	◇
		57	pot	(3)	____	○
		58	écorce	(2)	____	□
		59	dégoutter	(2)	____	△
		60	balcon	(1)	____	∩
		61	hameçon	(3)	____	♡
		62	récompenser	(3)	____	☆
		63	fatigué	(1)	____	◇
		64	cérémonie	(4)	____	○
8		65	mécanicien	(2)	____	□
		66	fragile	(3)	____	△
		67	tronc	(2)	____	∩
		68	anneau	(4)	____	♡
		69	vase	(3)	____	☆
		70	tir à l'arc	(2)	____	◇
		71	ustensile	(2)	____	○
		72	casserole	(3)	____	□
		73	pédale	(1)	____	△
		74	colère	(3)	____	∩
9		75	tranquillité	(3)	____	♡
		76	cylindrique	(1)	____	☆
		77	infirme	(1)	____	◇
		78	globe	(3)	____	○
		79	expliquer	(4)	____	□
		80	disséquer	(3)	____	△
		81	humain	(2)	____	∩
		82	île	(1)	____	♡
		83	moulinet	(1)	____	☆
		84	transparent	(3)	____	◇
10		85	communication	(4)	____	○
		86	piéton	(2)	____	□
		87	enflammé	(1)	____	△
		88	crampon	(2)	____	∩
		89	classer	(3)	____	♡
		90	véhicule	(4)	____	☆
		91	pyramide	(4)	____	◇
		92	isolement	(1)	____	○
		93	délabré	(4)	____	□
		94	médaillon	(1)	____	△
11		95	sommeiller	(3)	____	∩
		96	ajustable	(2)	____	♡
		97	dromadaire	(2)	____	☆
		98	extérieur	(1)	____	◇
		99	reptile	(2)	____	○
12		100	trajectoire	(1)	____	□
		101	crâne	(4)	____	△
		102	vigne	(4)	____	∩
		103	coopération	(3)	____	♡
		104	pendorie	(1)	____	☆
13		105	charpentier	(2)	____	◇
		106	nautique	(3)	____	○
		107	déception	(4)	____	□
		108	cascade	(4)	____	△
		109	pelucheux	(1)	____	∩
14		110	quatuor	(4)	____	♡
		111	vitrifié	(1)	____	☆
		112	avachi	(2)	____	◇
		113	parallélogramme	(1)	____	○
		114	cachet	(2)	____	□
15		115	sphérique	(2)	____	△
		116	rembourrage	(1)	____	∩
		117	belette	(2)	____	♡
		118	incertitude	(2)	____	☆
		119	sorros	(3)	____	◇
16+		120	ascension	(3)	____	○
		121	charogne	(1)	____	□
		122	boulon	(3)	____	△
		123	exténuée	(2)	____	∩
		124	félin	(2)	____	♡
		125	confidence	(3)	____	☆
		126	losange	(3)	____	◇
		127	arche	(4)	____	○
		128	constellation	(4)	____	□
		129	seringue	(2)	____	△
		130	indigent	(2)	____	∩
		131	perpendiculaire	(3)	____	♡
		132	assaillir	(1)	____	☆
		133	arrogant	(2)	____	◇
		134	péninsule	(4)	____	○
		135	spatule	(3)	____	□
		136	filtration	(1)	____	△
		137	consommer	(4)	____	∩
		138	aride	(4)	____	♡
		139	défense	(1)	____	☆
		140	côte	(3)	____	◇
		141	abrasif	(1)	____	○
		142	urne	(3)	____	□
		143	solennel	(3)	____	△
		144	contempler	(2)	____	∩
		145	brindille	(2)	____	♡
		146	inclément	(4)	____	☆
		147	calice	(2)	____	◇
		148	émacié	(2)	____	○
		149	spectre	(4)	____	□
		150	cornée	(2)	____	△
		151	entravé	(1)	____	∩
		152	enjoliver	(2)	____	♡
		153	jubilante	(2)	____	☆
		154	mercantile	(1)	____	◇
		155	incandescent	(4)	____	○
		156	obélisque	(1)	____	□
		157	palan	(1)	____	△
		158	agrume	(3)	____	∩
		159	restreindre	(1)	____	♡
		160	divergence	(4)	____	☆
		161	convexe	(1)	____	◇
		162	déambulation	(2)	____	○
		163	larcin	(4)	____	□
		164	émission	(3)	____	△
		165	tangente	(1)	____	∩
		166	entomologiste	(3)	____	♡
		167	homoncule	(4)	____	☆
		168	dénuement	(3)	____	◇
		169	repoussé	(4)	____	○
		170	anthropoïde	(3)	____	□

CALCUL DU SCORE BRUT

Numéro de l'item plafond _____

Moins les échecs _____

Score brut _____

(On compte les échecs entre la base supérieure et le plafond inférieur.)

NOTATION DE L'ÉCHELLE ET INTERPRÉTATION DES SCORES

(Pour plus de détails, voir le manuel.)

SCORE BRUT (de la page 2)

SCORE NORMALISÉ (voir annexe)

INTERVALLE DE CONFIANCE DU SCORE NORMALISÉ (voir ci-bas)

RANG CENTILE (Utiliser les échelles plus bas ou voir l'annexe.)

INTERVALLE DE CONFIANCE DU RANG CENTILE (voir ci-bas)

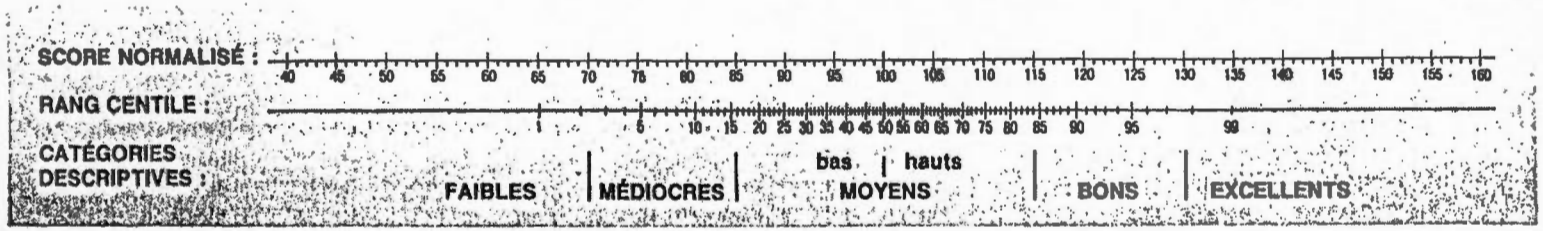
ÉQUIVALENCE D'ÂGE (voir annexe)

INTERVALLE DE CONFIANCE D'ÉQUIVALENCE D'ÂGE (voir annexe)

RECOMMANDATION : N'utiliser que les catégories descriptives en donnant les résultats aux parents ou gardiens.

INTERVALLE DE CONFIANCE DES SCORES NORMALISÉS ET DES RANGS CENTILES

Les échelles ci-dessous permettent de transformer les résultats en scores normalisés et en rangs centiles. Sur l'échelle supérieure indiquer le score normalisé du sujet. Dessiner un trait vertical à partir de ce score s'étendant jusqu'à l'échelle inférieure pour obtenir la conversion en rangs centiles. On délimite alors une distance de chaque côté du trait vertical égale à 8 points en scores normalisés; noircir une aire d'égale dimension ou 8 points en scores normalisés. Les chances sont de 68 sur 100 que le score vrai du sujet tombera dans cette aire ou intervalle de confiance. On peut alors noter le rang centile dans les cases pourvues ci-haut ainsi que les deux intervalles de confiance, une pour le score normalisé (de l'échelle inférieure). Voir la figure 3,2 dans le manuel pour des exemples.



RÉSULTATS AUX AUTRES TESTS

Nom du test	Date du test	Scores obtenus

OBSERVATIONS

Décrire brièvement le comportement du sujet durant l'épreuve; intérêt manifesté dans la tâche, rapidité à répondre, tendance à persévérer, facilement distrait, etc.

ÉVALUATION DE L'EXAMEN

L'EVIP donnera une évaluation approximative du vocabulaire d'écoute du sujet en français, par rapport aux résultats obtenus par l'échantillon canadien. Les résultats obtenus à l'épreuve représentent-ils justement le score vrai du sujet?
Oui _____ Non _____ Si non, pourquoi?

RECOMMANDATIONS

Signature de l'examinateur ou l'examinatrice : _____

D.5

The Symptom Checklist 90-Revised

SCL 90

JR MS AN

[1] [ ][ ] [ ][ ][ ][ ] [ ] [ ][ ] DATE: _____ [ ][ ][ ][ ][ ][ ] [ ][ ]

(1) (2-5) (6) (7-12) (13-14)

Ci-dessous se trouve une liste de problèmes et de plaintes que les gens formulent de temps à autre. Lisez attentivement chacune de ces plaintes et cochez une des réponses décrivant le mieux jusqu'à quel point ce problème vous a dérangé durant les sept derniers jours, aujourd'hui inclus.

EXEMPLE: Jusqu'à quel point avez-vous été dérangé par:

	Pas du tout	Un peu	Modérément	Passablement	Enormément
1-Des maux de dos	X	___	___	___	___

Scl 1 à 90

	Pas du tout	Un peu	Modérément	Passablement	Enormément	Pour fins d'analyse
1- Des maux de tête	①	②	③	④	⑤	[ ](15)
2- La nervosité ou tremblement intérieur	___	___	___	___	___	[ ](16)
3- Des pensées désagréables qui vous reviennent constamment	___	___	___	___	___	[ ](17)
4- Des évanouissements ou des étourdissements	___	___	___	___	___	[ ](18)
5- La perte de l'intérêt ou du plaisir sexuel	___	___	___	___	___	[ ](19)
6- Le fait d'être porté à critiquer les autres	___	___	___	___	___	[ ](20)
7- L'idée que quelqu'un d'autre contrôle vos pensées	___	___	___	___	___	[ ](21)
8- Le sentiment que les autres sont à blâmer pour la plupart de vos problèmes	___	___	___	___	___	[ ](22)

	Pas du tout	Un peu	Modé-rément	Passa-blement	Enormé-ment	Pour fins d'analyse
9- Le fait d'avoir de la difficulté à vous rappeler des choses	____	____	____	____	____	☐(23)
10- Le fait d'être inquiet(e) à propos de la malpropreté ou de la négligeance	____	____	____	____	____	☐(24)
11- Etre facilement ennuyé(e) ou irrité(e)	____	____	____	____	____	☐(25)
12- Des douleurs au coeur ou à la poitrine	____	____	____	____	____	☐(26)
13- La peur des espaces ouverts ou de la rue	____	____	____	____	____	☐(27)
14- Le sentiment de manquer d'énergie ou d'être au ralenti	____	____	____	____	____	☐(28)
15- Des pensées d'en terminer avec la vie	____	____	____	____	____	☐(29)
16- Le fait d'entendre des voix que les autres n'entendent pas	____	____	____	____	____	☐(30)
17- Des tremblements	____	____	____	____	____	☐(31)
18- Le sentiment qu'on ne peut pas se fier à la plupart des gens	____	____	____	____	____	☐(32)
19- Le peu d'appétit	____	____	____	____	____	☐(33)
20- Le fait de pleurer facilement	____	____	____	____	____	☐(34)
21- Le fait d'être gêné(e) ou mal à l'aise avec des personnes du sexe opposé	____	____	____	____	____	☐(35)
22- Le sentiment d'être pris(e) au piège ou immobilisé(e)	____	____	____	____	____	☐(36)
23- Avoir soudainement peur sans raison	____	____	____	____	____	☐(37)
24- Des accès de colère que vous ne pouviez pas contrôler	____	____	____	____	____	☐(38)

	Pas du tout	Un peu	Modérément	Passablement	Enormément	Pour fins d'analyse
25- Etre effrayé(e) de sortir de la maison seul(e)	____	____	____	____	____	☐(39)
26- Vous blâmer vous-même pour des choses	____	____	____	____	____	☐(40)
27- Des douleurs dans le bas du dos	____	____	____	____	____	☐(41)
28- Le sentiment de ne plus avancer dans ce que vous faites	____	____	____	____	____	☐(42)
29- Le sentiment d'être seul(e)	____	____	____	____	____	☐(43)
30- Le fait d'avoir le cafard	____	____	____	____	____	☐(44)
31- Le fait de trop vous inquiéter à propos de tout et de rien	____	____	____	____	____	☐(45)
32- N'être pas intéressée (e) à rien	____	____	____	____	____	☐(46)
33- Vous sentir craintif(ve)	____	____	____	____	____	☐(47)
34- Le fait que vos sentiments sont trop facilement blessés	____	____	____	____	____	☐(48)
35- Les autres gens sont au courant de vos pensées intimes	____	____	____	____	____	☐(49)
36- Le sentiment que les autres ne vous comprennent pas ou sont antipathiques	____	____	____	____	____	☐(50)
37- Le sentiment que les gens ne sont pas amicaux ou ne vous aiment pas	____	____	____	____	____	☐(51)
38- D'avoir à faire les choses très lentement pour s'assurer que tout est correct	____	____	____	____	____	☐(52)
39- Des palpitations ou des battements rapides du coeur	____	____	____	____	____	☐(53)
40- Des nausées ou l'estomac dérangé	____	____	____	____	____	☐(54)

	Pas du tout	Un peu	Modérément	Passablement	Enormément	Pour fins d'analyse
41- Le fait de vous sentir inférieur(e) aux autres	____	____	____	____	____	☐(55)
42- Des muscles endoloris	____	____	____	____	____	☐(56)
43- Le sentiment que vous êtes surveillé(e) ou que les autres parlent de vous	____	____	____	____	____	☐(57)
44- De la difficulté à vous endormir	____	____	____	____	____	☐(58)
45- Le fait d'avoir à vérifier et revérifier ce que vous faites	____	____	____	____	____	☐(59)
46- De la difficulté à prendre des décisions	____	____	____	____	____	☐(60)
47- La peur de voyager par autobus, métro ou train	____	____	____	____	____	☐(61)
48- De la difficulté à reprendre votre haleine	____	____	____	____	____	☐(62)
49- Bouffées de froid ou de chaleur	____	____	____	____	____	☐(63)
50- D'avoir à éviter certaines choses, endroits ou activités parce que vous en avez peur	____	____	____	____	____	☐(64)
51- Le fait d'avoir des blancs de mémoire	____	____	____	____	____	☐(65)
52- Des engourdissements ou des démangeaisons dans certaines parties de votre corps	____	____	____	____	____	☐(66)
53- Des serrements de gorge	____	____	____	____	____	☐(67)
54- Un sentiment de désespoir face à l'avenir	____	____	____	____	____	☐(68)
55- De la difficulté à vous concentrer	____	____	____	____	____	☐(69)

	Pas du tout	Un peu	Modérément	Passablement	Enormément	Pour fins d'analyse
56- Le fait de vous sentir faible dans certaines parties de votre corps	___	___	___	___	___	☐(70)
57- De vous sentir tendu(e) ou à bout de nerfs	___	___	___	___	___	☐(71)
58- Des sentiments de lourdeur dans les bras ou les jambes	___	___	___	___	___	☐(72)
59- De penser à la mort ou à mourir	___	___	___	___	___	☐(73)
60- Trop manger	___	___	___	___	___	☐(74)
61- Vous sentir mal à l'aise quand les gens vous regardent ou parlent de vous	___	___	___	___	___	☐(75)
62- Avoir des pensées qui ne sont pas les vôtres	___	___	___	___	___	☐(76)
63- Avoir envie de battre, blesser ou faire mal à quelqu'un	___	___	___	___	___	☐(77)
64- Vous réveiller aux petites heures du matin	___	___	___	___	___	☐(78)
65- Avoir à répéter les mêmes gestes comme toucher, compter, laver	___	___	___	___	___	☐(79)
66- Passer des nuits blanches ou avoir le sommeil troublé	___	___	___	___	___	☐(80)
				2	☐☐☐☐	☐
				(1)	(2-5)	(6)
67- Avoir des envies de briser ou casser des choses	___	___	___	___	___	☐(7)
68- Croire ou avoir l'idée que personne ne veut partager	___	___	___	___	___	☐(8)

	Pas du tout	Un peu	Modérément	Passablement	Enormément	Pour fins d'analyse
69- Vous sentir très intimidé(e) par les autres	___	___	___	___	___	☐(9)
70- Vous sentir mal à l'aise parmi les foules comme au cinéma ou dans les magasins	___	___	___	___	___	☐(10)
71- Le sentiment que tout est un effort	___	___	___	___	___	☐(11)
72- Des crises de frayeur ou de panique	___	___	___	___	___	☐(12)
73- Vous sentir mal à l'aise de manger ou boire en public	___	___	___	___	___	☐(13)
74- Avoir souvent des disputes	___	___	___	___	___	☐(14)
75- Vous sentir nerveux(se) lorsque vous êtes laissé seul(e)	___	___	___	___	___	☐(15)
76- Les autres ne vous accordent pas tout le mérite dû pour ce que vous faites	___	___	___	___	___	☐(16)
77- Le sentiment d'être seul(e) même lorsque vous êtes avec d'autres	___	___	___	___	___	☐(17)
78- Vous sentir si agité(e) que vous ne pouvez pas rester assis(e) tranquille	___	___	___	___	___	☐(18)
79- Sentiment d'être bon à rien	___	___	___	___	___	☐(19)
80- Le sentiment que quelque chose de mauvais va vous arriver	___	___	___	___	___	☐(20)
81- Le fait de crier et de lancer des objets	___	___	___	___	___	☐(21)
82- Avoir peur de vous évanouir en public	___	___	___	___	___	☐(22)

	Pas du tout	Un peu	Modé-rément	Passa-blement	Enormé-ment	Pour fins d'analyse
83- Le sentiment que les gens vont profiter de vous si vous les laissez faire	____	____	____	____	____	☐(23)
84- D'avoir des pensées à propos du sexe qui vous dérangent beaucoup	____	____	____	____	____	☐(24)
85- L'idée que vous devriez être puni(e) pour vos péchés	____	____	____	____	____	☐(25)
86- Des pensées et des impressions de nature effroyante	____	____	____	____	____	☐(26)
87- L'idée qu'il y a quelque chose de sérieux qui ne vas pas dans votre corps	____	____	____	____	____	☐(27)
88- Ne jamais vous sentir proche d'une autre personne	____	____	____	____	____	☐(28)
89- Des sentiments de culpabilité	____	____	____	____	____	☐(29)
90- L'idée que quelque chose ne va pas dans votre tête	____	____	____	____	____	☐(30)

D.6

The Revised Neo Personality Inventory

NEO PI-R™

Revised NEO Personality Inventory (NEO PI-R)

Item Booklet–Form S

Paul T. Costa, Jr., Ph.D. and Robert R. McCrae, Ph.D.

Instructions for use with the Hand-Scoring Answer Sheet

For use with the Machine-Scoring Answer Sheet, turn to page 2.

Please read all these instructions carefully before beginning. Mark all your answers on the answer sheet and write only where indicated. **DO NOT** write in this test booklet.

On the accompanying answer sheet, please write your name in the space provided. Indicate your sex by placing a check in the appropriate box under "Sex." Enter the date and your identification number, if you have been given one, in the spaces provided. Check "Yourself" in the space labeled "Person being rated" since you are describing yourself. Write in your age and check the box next to "S" in the space labeled "NEO Form."

This questionnaire contains 240 statements. Please read each item carefully and circle the one answer that best corresponds to your agreement or disagreement.

Circle "SD" if the statement is definitely false or if you **strongly disagree.**	(SD)	D	N	A	SA
Circle "D" if the statement is mostly false or if you **disagree.**	SD	(D)	N	A	SA
Circle "N" if the statement is about equally true or false, if you cannot decide,or if you are **neutral** on the statement.	SD	D	(N)	A	SA
Circle "A" if the statement is mostly true or if you **agree.**	SD	D	N	(A)	SA
Circle "SA" if the statement is definitely true or if you **strongly agree.**	SD	D	N	A	(SA)

There are no right or wrong answers, and you need not be an "expert" to complete this questionnaire. Describe yourself honestly and state your opinions as accurately as possible.

Answer every item. Note that the answers are numbered down the columns on the answer sheet. Please make sure that your answer is marked in the correctly numbered space. If you make a mistake or change your mind, **DO NOT ERASE!** Make an "X" through the incorrect response and then draw a circle around the correct response. After you have answered the 240 items, answer the three questions labeled A, B, and C on the answer sheet. Turn to page 3 in this booklet and begin with item 1.

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Instructions for use with the Machine-Scoring Answer Sheet

Please read all these instructions carefully before beginning. Use a No. 2 pencil to complete your responses on the accompanying answer sheet. Please mark all your answers on the answer sheet. **DO NOT** write in this test booklet.

On the answer sheet, fill in the circle next to "Self" in the box labeled "Person Rated" since you are describing yourself. Enter your name and/or identification number, if you have been given one, in the spaces provided and then fill in the corresponding circles below each box. In the box labeled "Test Form" fill in the circle next to the letter "S." In the spaces provided, fill in your sex, age, and today's date. Turn the answer sheet over.

This questionnaire contains 240 statements. Please read each item carefully and fill in the one answer that best corresponds to your agreement or disagreement.

Fill in "SD" if the statement is definitely false or if you **strongly disagree.** (SD) D N A SA

Fill in "D" if the statement is mostly false or if you **disagree.** SD (D) N A SA

Fill in "N" if the statement is about equally true or false, if you cannot decide,or if you are **neutral** on the statement. SD D (N) A SA

Fill in "A" if the statement is mostly true or if you **agree.** SD D N (A) SA

Fill in "SA" if the statement is definitely true or if you **strongly agree.** SD D N A (SA)

There are no right or wrong answers, and you need not be an "expert" to complete this questionnaire. Describe yourself honestly and state your opinions as accurately as possible.

Answer every item and be sure to fill in the circles completely. Note that the answers are numbered down the columns on the answer sheet. Please make sure that your answer is marked in the correctly numbered space. If you make a mistake or change your mind, erase your first answer completely. Then fill in the circle that corresponds to your correct answer. After you have answered the 240 items, please answer the three questions labeled A, B, and C on the answer sheet. Turn to page 3 in this booklet and begin with item 1.

1. I am not a worrier.
2. I really like most people I meet.
3. I have a very active imagination.
4. I tend to be cynical and skeptical of others' intentions.
5. I'm known for my prudence and common sense.
6. I often get angry at the way people treat me.
7. I shy away from crowds of people.
8. Aesthetic and artistic concerns aren't very important to me.
9. I'm not crafty or sly.
10. I would rather keep my options open than plan everything in advance.
11. I rarely feel lonely or blue.
12. I am dominant, forceful, and assertive.
13. Without strong emotions, life would be uninteresting to me.
14. Some people think I'm selfish and egotistical.
15. I try to perform all the tasks assigned to me conscientiously.
16. In dealing with other people, I always dread making a social blunder.
17. I have a leisurely style in work and play.
18. I'm pretty set in my ways.
19. I would rather cooperate with others than compete with them.
20. I am easy-going and lackadaisical.
21. I rarely overindulge in anything.
22. I often crave excitement.
23. I often enjoy playing with theories or abstract ideas.
24. I don't mind bragging about my talents and accomplishments.
25. I'm pretty good about pacing myself so as to get things done on time.
26. I often feel helpless and want someone else to solve my problems.
27. I have never literally jumped for joy.
28. I believe letting students hear controversial speakers can only confuse and mislead them.
29. Political leaders need to be more aware of the human side of their policies.
30. Over the years I've done some pretty stupid things.
31. I am easily frightened.
32. I don't get much pleasure from chatting with people.
33. I try to keep all my thoughts directed along realistic lines and avoid flights of fancy.
34. I believe that most people are basically well-intentioned.
35. I don't take civic duties like voting very seriously.
36. I'm an even-tempered person.
37. I like to have a lot of people around me.
38. I am sometimes completely absorbed in music I am listening to.
39. If necessary, I am willing to manipulate people to get what I want.
40. I keep my belongings neat and clean.
41. Sometimes I feel completely worthless.
42. I sometimes fail to assert myself as much as I should.
43. I rarely experience strong emotions.
44. I try to be courteous to everyone I meet.
45. Sometimes I'm not as dependable or reliable as I should be.

46. I seldom feel self-conscious when I'm around people.
47. When I do things, I do them vigorously.
48. I think it's interesting to learn and develop new hobbies.
49. I can be sarcastic and cutting when I need to be.
50. I have a clear set of goals and work toward them in an orderly fashion.
51. I have trouble resisting my cravings.
52. I wouldn't enjoy vacationing in Las Vegas.
53. I find philosophical arguments boring.
54. I'd rather not talk about myself and my achievements.
55. I waste a lot of time before settling down to work.
56. I feel I am capable of coping with most of my problems.
57. I have sometimes experienced intense joy or ecstasy.
58. I believe that laws and social policies should change to reflect the needs of a changing world.
59. I'm hard-headed and tough-minded in my attitudes.
60. I think things through before coming to a decision.
61. I rarely feel fearful or anxious.
62. I'm known as a warm and friendly person.
63. I have an active fantasy life.
64. I believe that most people will take advantage of you if you let them.
65. I keep myself informed and usually make intelligent decisions.
66. I am known as hot-blooded and quick-tempered.
67. I usually prefer to do things alone.
68. Watching ballet or modern dance bores me.
69. I couldn't deceive anyone even if I wanted to.
70. I am not a very methodical person.
71. I am seldom sad or depressed.
72. I have often been a leader of groups I have belonged to.
73. How I feel about things is important to me.
74. Some people think of me as cold and calculating.
75. I pay my debts promptly and in full.
76. At times I have been so ashamed I just wanted to hide.
77. My work is likely to be slow but steady.
78. Once I find the right way to do something, I stick to it.
79. I hesitate to express my anger even when it's justified.
80. When I start a self-improvement program, I usually let it slide after a few days.
81. I have little difficulty resisting temptation.
82. I have sometimes done things just for "kicks" or "thrills."
83. I enjoy solving problems or puzzles.
84. I'm better than most people, and I know it.
85. I am a productive person who always gets the job done.
86. When I'm under a great deal of stress, sometimes I feel like I'm going to pieces.
87. I am not a cheerful optimist.
88. I believe we should look to our religious authorities for decisions on moral issues.
89. We can never do too much for the poor and elderly.
90. Occasionally I act first and think later.

91. I often feel tense and jittery.
92. Many people think of me as somewhat cold and distant.
93. I don't like to waste my time daydreaming.
94. I think most of the people I deal with are honest and trustworthy.
95. I often come into situations without being fully prepared.
96. I am not considered a touchy or temperamental person.
97. I really feel the need for other people if I am by myself for long.
98. I am intrigued by the patterns I find in art and nature.
99. Being perfectly honest is a bad way to do business.
100. I like to keep everything in its place so I know just where it is.
101. I have sometimes experienced a deep sense of guilt or sinfulness.
102. In meetings, I usually let others do the talking.
103. I seldom pay much attention to my feelings of the moment.
104. I generally try to be thoughtful and considerate.
105. Sometimes I cheat when I play solitaire.
106. It doesn't embarrass me too much if people ridicule and tease me.
107. I often feel as if I'm bursting with energy.
108. I often try new and foreign foods.
109. If I don't like people, I let them know it.
110. I work hard to accomplish my goals.
111. When I am having my favorite foods, I tend to eat too much.
112. I tend to avoid movies that are shocking or scary.
113. I sometimes lose interest when people talk about very abstract, theoretical matters.
114. I try to be humble.
115. I have trouble making myself do what I should.
116. I keep a cool head in emergencies.
117. Sometimes I bubble with happiness.
118. I believe that the different ideas of right and wrong that people in other societies have may be valid for them.
119. I have no sympathy for panhandlers.
120. I always consider the consequences before I take action.
121. I'm seldom apprehensive about the future.
122. I really enjoy talking to people.
123. I enjoy concentrating on a fantasy or daydream and exploring all its possibilities, letting it grow and develop.
124. I'm suspicious when someone does something nice for me.
125. I pride myself on my sound judgment.
126. I often get disgusted with people I have to deal with.
127. I prefer jobs that let me work alone without being bothered by other people.
128. Poetry has little or no effect on me.
129. I would hate to be thought of as a hypocrite.
130. I never seem to be able to get organized.
131. I tend to blame myself when anything goes wrong.
132. Other people often look to me to make decisions.
133. I experience a wide range of emotions or feelings.
134. I'm not known for my generosity.
135. When I make a commitment, I can always be counted on to follow through.

136. I often feel inferior to others.
137. I'm not as quick and lively as other people.
138. I prefer to spend my time in familiar surroundings.
139. When I've been insulted, I just try to forgive and forget.
140. I don't feel like I'm driven to get ahead.
141. I seldom give in to my impulses.
142. I like to be where the action is.
143. I enjoy working on "mind-twister"-type puzzles.
144. I have a very high opinion of myself.
145. Once I start a project, I almost always finish it.
146. It's often hard for me to make up my mind.
147. I don't consider myself especially "light-hearted."
148. I believe that loyalty to one's ideals and principles is more important than "open-mindedness."
149. Human need should always take priority over economic considerations.
150. I often do things on the spur of the moment.
151. I often worry about things that might go wrong.
152. I find it easy to smile and be outgoing with strangers.
153. If I feel my mind starting to drift off into daydreams, I usually get busy and start concentrating on some work or activity instead.
154. My first reaction is to trust people.
155. I don't seem to be completely successful at anything.
156. It takes a lot to get me mad.
157. I'd rather vacation at a popular beach than an isolated cabin in the woods.
158. Certain kinds of music have an endless fascination for me.
159. Sometimes I trick people into doing what I want.
160. I tend to be somewhat fastidious or exacting.
161. I have a low opinion of myself.
162. I would rather go my own way than be a leader of others.
163. I seldom notice the moods or feelings that different environments produce.
164. Most people I know like me.
165. I adhere strictly to my ethical principles.
166. I feel comfortable in the presence of my bosses or other authorities.
167. I usually seem to be in a hurry.
168. Sometimes I make changes around the house just to try something different.
169. If someone starts a fight, I'm ready to fight back.
170. I strive to achieve all I can.
171. I sometimes eat myself sick.
172. I love the excitement of roller coasters.
173. I have little interest in speculating on the nature of the universe or the human condition.
174. I feel that I am no better than others, no matter what their condition.
175. When a project gets too difficult, I'm inclined to start a new one.
176. I can handle myself pretty well in a crisis.
177. I am a cheerful, high-spirited person.
178. I consider myself broad-minded and tolerant of other people's lifestyles.
179. I believe all human beings are worthy of respect.
180. I rarely make hasty decisions.

181. I have fewer fears than most people.
182. I have strong emotional attachments to my friends.
183. As a child I rarely enjoyed games of make believe.
184. I tend to assume the best about people.
185. I'm a very competent person.
186. At times I have felt bitter and resentful.
187. Social gatherings are usually boring to me.
188. Sometimes when I am reading poetry or looking at a work of art, I feel a chill or wave of excitement.
189. At times I bully or flatter people into doing what I want them to.
190. I'm not compulsive about cleaning.
191. Sometimes things look pretty bleak and hopeless to me.
192. In conversations, I tend to do most of the talking.
193. I find it easy to empathize—to feel myself what others are feeling.
194. I think of myself as a charitable person.
195. I try to do jobs carefully, so they won't have to be done again.
196. If I have said or done the wrong thing to someone, I can hardly bear to face them again.
197. My life is fast-paced.
198. On a vacation, I prefer going back to a tried and true spot.
199. I'm hard-headed and stubborn.
200. I strive for excellence in everything I do.
201. Sometimes I do things on impulse that I later regret.
202. I'm attracted to bright colors and flashy styles.
203. I have a lot of intellectual curiosity.
204. I would rather praise others than be praised myself.
205. There are so many little jobs that need to be done that I sometimes just ignore them all.
206. When everything seems to be going wrong, I can still make good decisions.
207. I rarely use words like "fantastic!" or "sensational!" to describe my experiences.
208. I think that if people don't know what they believe in by the time they're 25, there's something wrong with them.
209. I have sympathy for others less fortunate than me.
210. I plan ahead carefully when I go on a trip.
211. Frightening thoughts sometimes come into my head.
212. I take a personal interest in the people I work with.
213. I would have difficulty just letting my mind wander without control or guidance.
214. I have a good deal of faith in human nature.
215. I am efficient and effective at my work.
216. Even minor annoyances can be frustrating to me.
217. I enjoy parties with lots of people.
218. I enjoy reading poetry that emphasizes feelings and images more than story lines.
219. I pride myself on my shrewdness in handling people.
220. I spend a lot of time looking for things I've misplaced.
221. Too often, when things go wrong, I get discouraged and feel like giving up.
222. I don't find it easy to take charge of a situation.
223. Odd things—like certain scents or the names of distant places—can evoke strong moods in me.
224. I go out of my way to help others if I can.
225. I'd really have to be sick before I'd miss a day of work.

226. When people I know do foolish things, I get embarrassed for them.
227. I am a very active person.
228. I follow the same route when I go someplace.
229. I often get into arguments with my family and co-workers.
230. I'm something of a "workaholic."
231. I am always able to keep my feelings under control.
232. I like being part of the crowd at sporting events.
233. I have a wide range of intellectual interests.
234. I'm a superior person.
235. I have a lot of self-discipline.
236. I'm pretty stable emotionally.
237. I laugh easily.
238. I believe that the "new morality" of permissiveness is no morality at all.
239. I would rather be known as "merciful" than as "just."
240. I think twice before I answer a question.

UQAM

NEO PI-R™

Hand-Scoring Answer Sheet

Name	Sex	Date	ID number
	☐ Male ☐ Female		

Person being rated: ☐ Yourself ☐ Male ☐ Female His/Her initials _____ **Age** _____ **NEO Form:** ☐ S ☐ R

SD = Strongly Disagree D = Disagree N = Neutral A = Agree SA = Strongly Agree

1 SD D N A SA	31 SD D N A SA	61 SD D N A SA	91 SD D N A SA	121 SD D N A SA	151 SD D N A SA	181 SD D N A SA	211 SD D N A SA
2 SD D N A SA	32 SD D N A SA	62 SD D N A SA	92 SD D N A SA	122 SD D N A SA	152 SD D N A SA	182 SD D N A SA	212 SD D N A SA
3 SD D N A SA	33 SD D N A SA	63 SD D N A SA	93 SD D N A SA	123 SD D N A SA	153 SD D N A SA	183 SD D N A SA	213 SD D N A SA
4 SD D N A SA	34 SD D N A SA	64 SD D N A SA	94 SD D N A SA	124 SD D N A SA	154 SD D N A SA	184 SD D N A SA	214 SD D N A SA
5 SD D N A SA	35 SD D N A SA	65 SD D N A SA	95 SD D N A SA	125 SD D N A SA	155 SD D N A SA	185 SD D N A SA	215 SD D N A SA
6 SD D N A SA	36 SD D N A SA	66 SD D N A SA	96 SD D N A SA	126 SD D N A SA	156 SD D N A SA	186 SD D N A SA	216 SD D N A SA
7 SD D N A SA	37 SD D N A SA	67 SD D N A SA	97 SD D N A SA	127 SD D N A SA	157 SD D N A SA	187 SD D N A SA	217 SD D N A SA
8 SD D N A SA	38 SD D N A SA	68 SD D N A SA	98 SD D N A SA	128 SD D N A SA	158 SD D N A SA	188 SD D N A SA	218 SD D N A SA
9 SD D N A SA	39 SD D N A SA	69 SD D N A SA	99 SD D N A SA	129 SD D N A SA	159 SD D N A SA	189 SD D N A SA	219 SD D N A SA
10 SD D N A SA	40 SD D N A SA	70 SD D N A SA	100 SD D N A SA	130 SD D N A SA	160 SD D N A SA	190 SD D N A SA	220 SD D N A SA
11 SD D N A SA	41 SD D N A SA	71 SD D N A SA	101 SD D N A SA	131 SD D N A SA	161 SD D N A SA	191 SD D N A SA	221 SD D N A SA
12 SD D N A SA	42 SD D N A SA	72 SD D N A SA	102 SD D N A SA	132 SD D N A SA	162 SD D N A SA	192 SD D N A SA	222 SD D N A SA
13 SD D N A SA	43 SD D N A SA	73 SD D N A SA	103 SD D N A SA	133 SD D N A SA	163 SD D N A SA	193 SD D N A SA	223 SD D N A SA
14 SD D N A SA	44 SD D N A SA	74 SD D N A SA	104 SD D N A SA	134 SD D N A SA	164 SD D N A SA	194 SD D N A SA	224 SD D N A SA
15 SD D N A SA	45 SD D N A SA	75 SD D N A SA	105 SD D N A SA	135 SD D N A SA	165 SD D N A SA	195 SD D N A SA	225 SD D N A SA
16 SD D N A SA	46 SD D N A SA	76 SD D N A SA	106 SD D N A SA	136 SD D N A SA	166 SD D N A SA	196 SD D N A SA	226 SD D N A SA
17 SD D N A SA	47 SD D N A SA	77 SD D N A SA	107 SD D N A SA	137 SD D N A SA	167 SD D N A SA	197 SD D N A SA	227 SD D N A SA
18 SD D N A SA	48 SD D N A SA	78 SD D N A SA	108 SD D N A SA	138 SD D N A SA	168 SD D N A SA	198 SD D N A SA	228 SD D N A SA
19 SD D N A SA	49 SD D N A SA	79 SD D N A SA	109 SD D N A SA	139 SD D N A SA	169 SD D N A SA	199 SD D N A SA	229 SD D N A SA
20 SD D N A SA	50 SD D N A SA	80 SD D N A SA	110 SD D N A SA	140 SD D N A SA	170 SD D N A SA	200 SD D N A SA	230 SD D N A SA
21 SD D N A SA	51 SD D N A SA	81 SD D N A SA	111 SD D N A SA	141 SD D N A SA	171 SD D N A SA	201 SD D N A SA	231 SD D N A SA
22 SD D N A SA	52 SD D N A SA	82 SD D N A SA	112 SD D N A SA	142 SD D N A SA	172 SD D N A SA	202 SD D N A SA	232 SD D N A SA
23 SD D N A SA	53 SD D N A SA	83 SD D N A SA	113 SD D N A SA	143 SD D N A SA	173 SD D N A SA	203 SD D N A SA	233 SD D N A SA
24 SD D N A SA	54 SD D N A SA	84 SD D N A SA	114 SD D N A SA	144 SD D N A SA	174 SD D N A SA	204 SD D N A SA	234 SD D N A SA
25 SD D N A SA	55 SD D N A SA	85 SD D N A SA	115 SD D N A SA	145 SD D N A SA	175 SD D N A SA	205 SD D N A SA	235 SD D N A SA
26 SD D N A SA	56 SD D N A SA	86 SD D N A SA	116 SD D N A SA	146 SD D N A SA	176 SD D N A SA	206 SD D N A SA	236 SD D N A SA
27 SD D N A SA	57 SD D N A SA	87 SD D N A SA	117 SD D N A SA	147 SD D N A SA	177 SD D N A SA	207 SD D N A SA	237 SD D N A SA
28 SD D N A SA	58 SD D N A SA	88 SD D N A SA	118 SD D N A SA	148 SD D N A SA	178 SD D N A SA	208 SD D N A SA	238 SD D N A SA
29 SD D N A SA	59 SD D N A SA	89 SD D N A SA	119 SD D N A SA	149 SD D N A SA	179 SD D N A SA	209 SD D N A SA	239 SD D N A SA
30 SD D N A SA	60 SD D N A SA	90 SD D N A SA	120 SD D N A SA	150 SD D N A SA	180 SD D N A SA	210 SD D N A SA	240 SD D N A SA

A. I have tried to answer all of these questions honestly and accurately. (circle one) SD D N A SA

B. Have you responded to all of the statements? (circle one) Yes No

C. Have you entered your responses in the correct areas? (circle one) Yes No

PAR Psychological Assessment Resources, Inc.
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D.7

Intolerance of Uncertainty Scale (Short Form)

Identification : _____

Date : _____

Voici une série d'énoncés qui représentent comment les gens peuvent réagir à l'incertitude dans la vie. Veuillez utiliser l'échelle ci-dessous pour exprimer jusqu'à quel point chacun des énoncés suivants correspond à vous (écrivez le numéro vous représentant, à l'avant de chacun des énoncés).

1	2	3	4	5
Pas du tout correspondant	**Un peu correspondant**	**Assez correspondant**	**Très correspondant**	**Tout à fait correspondant**

1. _____ Les imprévus me dérangent énormément.
2. _____ Ça me frustre de ne pas avoir toute l'information dont j'ai besoin.
3. _____ On devrait tout prévenir pour éviter les surprises.
4. _____ Un léger imprévu peut tout gâcher, même la meilleure des planifications.
5. _____ Je veux toujours savoir ce que l'avenir me réserve.
6. _____ Je ne tolère pas d'être indécis(e) au sujet de mon avenir.
7. _____ Je devrais être capable de tout organiser à l'avance.
8. _____ L'incertitude m'empêche de profiter pleinement de la vie.
9. _____ Lorsque c'est le temps d'agir, l'incertitude me paralyse.
10. _____ Lorsque je suis incertain(e), je ne peux pas bien fonctionner.
11. _____ Le moindre doute peut m'empêcher d'agir.
12. _____ Je dois me retirer de toute situation incertaine.